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THE UNIVERSITY OF ALBERTA

A NORMATIVE STUDY OF SELECTED TRACK AND FIELD EVENTS FOR  
EDMONTON HIGH SCHOOL BOYS

by

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A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "A Normative Study of Selected Track and Field Events for Edmonton High School Boys," submitted by Lee S. Fairbanks in partial fulfilment of the requirements for the degree of Master of Arts.



## ABSTRACT

The specific problem was to establish percentile norms in five track and field events for the male population of physical education students in the Edmonton senior high schools. The test items selected were the: one hundred yard dash, one mile run, running high jump, running long jump and the eight pound shot put. The study also noted the difference in the means of the mile run on grass and on cinders; the difference in the means of the straddle, scissors, and western style of high jump; the difference in the means for the long jump with and without the take-off board rulings; the difference in the means of the O'Brien and the older, orthodox style of throwing the shot.

The tests were administered by thirty-seven teachers to 2,941 boys in their regular physical education classes during May, 1966. This represented 90 per cent of the total population of students enrolled in physical education. The teachers were given detailed instructions for standardizing the administration and measuring procedures. Measuring instruments were calibrated prior to testing. Each teacher was contacted to check the validity of his data. Reliability coefficients were calculated from the retest data obtained from ninety subjects.

All data were checked and transferred to IBM punch cards. The cards were sorted and counted to obtain frequency distributions for each test item according to age and also the Cozens-Trieb-Nelson classification formula combining age, height, and weight. Percentile norms were drawn up for each test item. Means, standard deviations, and measures



of skewness were obtained from the IBM 7040 Computer at the University of Alberta.

The distribution of scores for the dash and the mile were negatively skewed in all classes. The high jump and long jump distributions were skewed less than the running events. Shot put scores were considered normally distributed with the small amount of skewness shifting from positive to negative with increasing age.

Performance scores improved with age in all events except the one mile run. There was a decrease in performance at the class 1A level when the students were grouped according to age, height, and weight. The only exception to this occurred in the shot put event where the factor of body weight appeared to be an advantage.

There was no significant difference in the means for the one mile run on cinders and on grass tracks.

A significant difference was obtained at the .01 level when each of the straddle and the western high jump means were compared to that of the scissors style. No difference was found between the straddle and the western means.

Boys were able to long jump six inches farther when they were not restricted to the take-off board rulings.

Students using the O'Brien style had a mean throw of twenty-three inches farther than those using the Orthodox style. This difference was highly significant at the .01 level of confidence.



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## CHAPTER I

### STATEMENT OF THE PROBLEM

#### I. INTRODUCTION

The fundamental physical skills of running, jumping and throwing are basic to track and field events. Through the ages from ancient times these skills have been incorporated into recognized events in athletic competition. Performance records are being challenged and surpassed with the result that new standards of performance are set at the various levels of competition. These records are a great source of motivation particularly to those of superior ability who are prepared to discipline themselves to strenuous training programs.

Standards have been established for various types of tests of physical fitness and motor fitness. The 1965 AAHPER Youth Fitness Test results (18) show that the average twelve year old boy in the United States today can run the fifty-yard dash two-tenths of a second faster, throw a softball ten feet farther, broad jump five inches farther, and do nineteen more sit-ups than his counterpart of 1958. The emphasis in physical education on physical fitness may partially account for the increase in performance. With performance records being broken and physical fitness test results showing improvement, it would be reasonable to expect that performance in skills is improving.

There is a need for achievement standards to be developed whereby future performances can be compared to those of today. It would then be



possible to measure changes in the level of performance of people in the area where the standards were originally developed. The first project to establish norms for Edmonton schools was by Routledge (25) in 1959 using the AAHPER Youth Fitness Test as the measuring instrument. In 1963, Routledge (26) designed an Athletic Standard Pentathlon Scoring Table for Boys and Girls based on McCloy's formula (19). He used data collected from 1959 to 1962 from high school meets in the United States, Ontario and Edmonton secondary schools. At the present time there are no track and field norms or achievement scales that are based on the whole population of senior high school boys physical education classes in Edmonton.

## II. THE PROBLEM

### Statement of the Problem

The purpose of this study is to establish percentile norms from performances in selected track and field events. The results of this study are designed to be a source of motivation for teachers and students, and to serve as an instrument for evaluation and comparison of performance in track and field events. The population consisted of all boys enrolled in physical education classes in the Edmonton Public and Edmonton Separate High Schools. In the province of Alberta, physical education is compulsory for all grade ten students and optional in grades eleven and twelve. The testing was conducted during the regular physical education periods in May, 1966.



### Sub-Problems

Some of the schools in Edmonton do not have cinder tracks. The study will determine the difference in the means of the one mile run on grass as compared to cinders.

The style of high jump used by each subject was noted on the score card. The differences in the means of the straddle or belly roll, scissors, and western roll techniques were calculated.

In the running long jump, each subject was measured for his performance when using the take-off board, and also when not using the board. The means of the two types of long jumps were compared.

The starting position that each subject used in the throwing circle of the shot put event was recorded on the score sheet as either the O'Brien style facing directly opposite to the direction of the put, or the older orthodox style of facing at approximately right angles to the direction of the put. The differences in the means of the two throwing techniques was calculated.

### Justification for the Test Items

The five track and field events selected were the one-hundred yard dash, one mile run, running high jump, running long jump, and the eight-pound shot put. The limited amount of class time available to complete the testing on such a large scale made it impossible to measure performances for all events. It was, therefore, decided to select one event from each of the following five main groups of events: sprints, middle distance runs, jumping for height, jumping for distance, and throwing events.



The one-hundred yard dash was preferred to the longer sprints because it could be administered on a straight rather than a curved or oval track surface. It is primarily an event measuring speed of movement where the influence of endurance is minimized.

The one mile run was selected as a measure of speed where endurance is a prime factor. It is also the longest distance run included in Alberta high school competition. Students generally were somewhat familiar with this event due to the fact that it is also a component of the 5BX Physical Fitness Test used in some schools. The running high jump was chosen rather than the pole vault because it measures jumping ability without assistance from a mechanical device. Furthermore, students in grade ten had no previous training in vaulting prior to high school whereas they have had several years of high jumping. The time factor also favored the high jump event.

The running long jump was included as a less complex skill than the triple jump. It also is more often practiced as a jumping event whereas students who compete in the triple jump are those who have ability in the long jump.

The shot put was chosen in favor of the other throwing events. The javelin throw is not included in the curriculum and the discus event is not taught in the junior high schools. Although the eight pounds, thirteen ounce shot put (four kilogrammes) was introduced for competition in 1965 replacing the eight pound shot put, the latter weight was used in view of the fact that schools did not have the heavier shots.

The skills of running, jumping and throwing are fundamental to all of man's physical activities. They are particularly basic to the



events selected for this study. It is therefore reasonable to undertake a project of this nature and magnitude. It is possible that further studies will select other events from each of the above main groups.

### Importance of the Study

The results of this study have immediate practical value to the physical educators in the Edmonton schools. As a diagnostic tool, norms can be used to provide the teacher with information about the status and progress of the students. There is a need to have achievement scales in order to compare student performances in track and field events. They may also be used by the students as a self-testing device to stimulate and motivate them to improve their performance. The data of this study may be used to develop a longitudinal record of each student's performance during his high school years in physical education. This study will provide a basis for comparison of similar data that may be gathered in succeeding years.

### Delimitations

This study was limited to all the boys enrolled in physical education classes in Edmonton Public and Edmonton Separate High Schools except those individuals whose physical defects were of such a nature as to affect their performance. The resulting norms, therefore, are not applicable to them. The number of items selected for the study was limited to two track and three field events. The variables for which data were obtained for each subject was as follows:



(a) Age		
(b) Height		
(c) Weight		
(d) Sprint or Dash	—	One Hundred Yard Dash (on grass)
(e) Middle Distance Run	—	One Mile Run (on grass or cinders)
(f) Jump for Height	—	Running High Jump (using straddle, scissors or western roll)
(g) Jump for Distance	—	Running Long Jump (with and without the take-off board)
(h) Throw for Distance	—	Eight Pound Shot Put (with O'Brien or orthodox style)

This study was designed for the purpose of establishing norms from performance scores in selected track and field events. There has been no attempt to measure the physical fitness of the population although it is recognized as a factor that is related to performance.

Data were collected from thirty-seven of the forty-one physical education teachers for 2,941 boys from thirteen of the fourteen senior high schools in Edmonton. Tables of norms were developed for 2,927 boys of ages 14 to 19 years inclusive.

#### Limitations

Some students were not included in the study because of physical defects, injuries, illness or absence. It was, therefore, not possible to obtain results from the whole high school physical education population. One subject was 13 years of age, ten were of age 20 years, two were of age 21 years and one was 23 years of age. It was not considered practical to attempt to develop norms for these ages.



The size of the project made it necessary for a large number of physical education teachers to measure and record the performances of their own students. The standardizing of methods and procedures for such a large group of testers was a weakness of this study. Two special briefing sessions were held to minimize any variation in testing techniques.

Schools that did not have a regulation cinder track available tested their boys for the one mile run on a measured grass surface. It was not possible to control the variability of the cinder and the grass track conditions at the various schools.

#### Definitions of Terms Used

Age. The age of each subject in years only, as at May 1st, 1966. For purposes of determining the Cozens-Trieb-Nelson classification index, age was taken in years and months, to the nearest month, as at May 1st, 1966.

Height. The height of each subject in inches and halves, to the nearest half-inch. Heights were taken in bare feet. Readings exactly at the one-quarter and three-quarter inch marks were taken to the next half-inch above.

Weight. The weight of each subject in pounds, to the nearest pound. Each subject was weighed with clothing removed.

One Hundred Yard Dash. A track event of one hundred yards in length, timed to the nearest one-tenth of a second. Each subject wore gymnasium type shoes.



One Mile Run. A track event one mile in length, timed to the nearest second. Each subject wore gymnasium type shoes.

Running High Jump. A field event which consists of a running approach, a jump over a horizontal bar with a one-foot take-off. The subject's best jump was measured to the nearest half-inch. Each subject wore gymnasium type shoes.

Running Long Jump. A field event which consists of a running approach. A one-foot take-off, a flight through the air and a two-foot landing. Each subject wore gymnasium type shoes.

Eight Pound Shot Put. A weight throwing event in which a shot weighing eight pounds is put from within a circle on the ground having a diameter of seven feet. A stop board was attached to the front of the circle. Distances were measured to the nearest inch. Each subject wore gymnasium type shoes.

Cozens-Trieb-Neilson Classification Index. The figure obtained by using the formula,  $2 \times \text{Age in years and months} + .475 \times \text{Height in inches} + .16 \times \text{Weight in pounds}$ . This classification system was determined as the best-fit index for secondary school boys and adopted by the California Interscholastic Federation (9) in 1935.

Norms. For this study norms are percentile achievement scales or standards by which the performance scores of individuals and groups may be compared in the same measures.



Classification. A method by which individuals may be handicapped to eliminate or hold constant the effect of those factors whose influence might otherwise obscure differences in athletic ability.



## CHAPTER II

### REVIEW OF THE LITERATURE

#### I. ACHIEVEMENT SCALES

The development of achievement scales in physical education is a relatively recent area of research. Weiss (32) concluded from his search of the literature in 1949 that very little work had been done in the measurement of skills prior to 1905. Glassow and Broer (16) noted that only thirteen references to achievement scales were dated earlier than 1934. Bovard and Cozens (3) reported that before 1925, practically all measurement was more or less unscientific in its nature. Achievement standards were largely empirical, based upon experience, to determine what pupils should be able to accomplish with respect to performance. The construction of scientific measurement devices was somewhat delayed due to a lack of adequate statistical knowledge. However, more recently, appropriate statistical tools have been applied in the development of measurement devices and achievement scales with more satisfactory results.

In 1930, Bovard and Cozens (3) published the most complete text on tests and measurement to that time. In their 1949 edition, Bovard, Cozens and Hagman (4:14) concluded that:

The concept that further progress can be made only by means of increased knowledge of scientific procedures has little by little pervaded the entire professional atmosphere. Measurement must unquestionably be grouped in the category of scientific procedures essential to continued professional progress.



In 1931, Brace (5) indicated that not much had been accomplished toward measuring pupil achievement in physical education. He criticized the idea that redirection of the physical education program be on the basis of such tests as the Strength Index. He maintained that the activities of the program should be based upon information as to pupil achievement in the various activities concerned in view of the fact that one of the important aims of physical education is the teaching of neuro-muscular skills in educative and recreational activities. He further stated:

Physical education is more than a school subject. It is a way of education. The measurement of pupil achievement in physical education involves measuring activities as different from each other as reading is from arithmetic or art. (5:14)

Clarke (6:261) states in his book on measurement in physical education, that:

The learning of desirable skills is the very foundation of physical education. It is through the development of skills and subsequent practice in them that physical educators realize their objectives. Accomplished performance in skills provides incentive for their continuance. To evaluate status and progress in the acquisition of skills, therefore, is an important phase of measurement in physical education.

Cozens, Trieb, and Neilson (9) also maintain that teachers and administrators should have scientific measuring devices by which they can obtain information about the capacities and abilities of students under their direction.

During the last thirty years, physical educators have made many contributions to the measurement of performance and skill in athletic activities. In 1936, Cozens, Trieb, and Neilson (9) indicated that one of the most important changes which had taken place in physical education



was the scientific attitude that was growing among men and women in the area of measurement. This is reflected in their statement that:

There has been a growing tendency to provide more and better measuring devices which will enable the teacher to better evaluate his program. It has been discovered that the measurement of achievement in physical education activities is essential to an efficient program of instruction, and that boys must be placed in properly classified groups to ensure the scientific accuracy of this measurement. (9:3)

Cozens, Trieb, and Neilson (9) established achievement scales for forty-five events based on data gathered in the Los Angeles City School District and surrounding communities. Over fifty-six thousand performance records were used with six different classes in each event yielding an average of twelve hundred and fifty records per event.

It is not intended to give a detailed history of the development of achievement scales. It is sufficient at this point to note that during the last thirty years this growing scientific interest in measurement has led many researchers to develop standards and norms that can be used by physical education teachers and students.

Ross (24:13) maintains that measurement should be included in the category of scientific procedures essential to continued professional progress. He states:

There is a direct relationship between the status of a science and the degree to which measurement has been developed in it. . . . The prominence of measurement in a science appears to be roughly in inverse ratio to the complexity of its subject matter. Inert material seems inherently more susceptible to measurement than living organisms. Apparently the maximum difficulty comes in the case of man, particularly in his social behavior. All measurement is subject to errors. . . due to limitations in the tools as well as in the techniques of measurement.

Standards or norms have their greatest value when they are used



by the population from which they were originally developed. Although a large number of standards have been produced for a wide variety of activities and for numerous populations, very little has been done in the Edmonton high schools to develop local norms. In 1959, Routledge (25) established norms for the AAHPER Youth Fitness Test based on the male population in Edmonton Public Junior and Senior High Schools who were enrolled in physical education classes. In 1963, Routledge (26) also developed an Athletic Standard Pentathlon Scoring Table for Boys and Girls.

## II. CLASSIFICATIONS

It is a well established fact that each individual is a unique person possessing factors that make him different from everyone else. The problem of equating one individual to another or of grouping individuals into somewhat homogeneous categories appears to be a vast area for research. However, norms have been developed for numerous types of tests and skills in physical education using various methods of classification. Clarke points to the problem when he says:

. . . The establishment and application of norms for all subjects in a particular designation do not allow for the many factors that make individuals "normally" different. This difficulty is not confined alone to norms applied to physical fitness testing; it is true wherever norms are used in human measurement. (6:206)

Bookwalter (2:124) made a critical evaluation of some of the existing methods of classifying boys for physical education in 1939 and concluded that:

In general, the indications are that statistical combinations of a reasonable number of factors do not justify the added difficulty of administration, and that they may be even less desirable than some measures employed alone.



Fleishman (14) developed national norms for the Basic Fitness Test based on age. He indicated that any attempt to make "corrections" for such factors as height and weight within the age groups would introduce more error than correction. With age being correlated with size, the age categories take care of most of the differences in size. Gross and Casciani (17) in 1962 concluded that for the AAHPER Youth Fitness Test the indexes using age, height and weight have little value for classification of individuals. In 1963 Espenschade concluded from her study of the relationships between physical performances and age, height, and weight, that age alone should be used as the basis for developing test norms. Heinsicker and Reiff (18) however, continued to use both age, and the Cozens-Trieb-Neilson classification index combining age, height and weight when they revised the national AAHPER Youth Fitness Test norms in 1965 from their 1958 study.

For this particular study, it was decided to produce norms based on age categories, and also to include additional tables based on the Cozens-Trieb-Neilson Classification Index in view of the fact that local AAHPER Fitness norms are available in the same categories.

#### Age

In 1935 McCloy (20) studied the relationship of chronological age and performance and concluded that the relationship was curvilinear. Clearley (7) found that the relationship between ability in athletics as measured by the records in the standing broad jump, softball throw, and six-second run and the variables of age, height and weight was, for boys and girls of ages 9 to 17 years, found to be non-linear. Age made



its greatest contribution to the prediction of ability in athletics at 15.5 years. The factors of height and weight made their greatest contribution to the prediction of ability in athletics at seventy-one inches and fifty-five pounds respectively.

Chronological age and maturational age are related but not synonymous. It is not difficult to find two boys with the same chronological age who are vastly different in terms of physical maturity. It is equally easy to point to the example of two boys of the same age who vary greatly in height and weight. Available research indicates that, although inequalities will always be part of an age classification system, they do not necessarily become equalized with classification systems that also take into account the factors of height and weight.

Additional mental as well as physical factors that are not as easily measured as age, height and weight may have to be properly evaluated in future research on classification techniques.

At the present time the Edmonton High School Athletic Council sponsors city regional and city final track and field competition with three age classes for boys and two age classes for girls. These same age classes are followed for provincial competition under the direction of the Alberta Schools' Athletic Association. A somewhat different age classification is used by the Amateur Athletic Union of Canada for the National Standards Plan for Track and Field.

Teachers in physical education classes tend to think of their classes as one group, whereas, if age was taken into consideration, a range of three years may exist at the high school level. In view of the research to date it would seem more appropriate to evaluate athletic



performance with respect to the existing age variations.

For the purposes of this study the boys have been classified according to age in years only according to their last birthday as at May 1st, 1966. This was interpreted to mean that a boy having his sixteenth birthday on May 1st would be included in the age sixteen group, whereas a boy having his sixteenth birthday on May 2nd would be included in the age fifteen class.

#### Age, Height, and Weight

In an effort to improve on classifications by age, physical educators have studied the merits of various methods of grouping individuals for athletic competition.

Prior to 1917, a number of attempts were made in the United States to group boys in such a way as to minimize the possibility of having large, mature boys compete against smaller mature boys and of having large, immature boys compete against smaller immature boys. At first, weight was the factor which was considered for grouping boys. Later, the factors of age, grade, height, and weight were used by Reilly (23) in 1917, and modified in 1922 for senior high school boys by Stolz (29). This revision was used by the California Interscholastic Federation until 1935.

McCloy (19) studied the problem of classification and in 1932 he brought forth the formula  $20 \times \text{Age} + 6 \times \text{Height} + \text{Weight}$ . This index placed more emphasis on height and less emphasis on weight than his earlier formula. While it may be argued that many factors affect performance, it must be recognized that a usable system must be simple



to administer. McCloy was able to show that the factor of school grade was taken care of by the age factor.

Two important facts studied by Cozens, Trieb, and Neilson (9) resulted in a different index formula for secondary school boys rather than adopt McCloy's formula used for elementary school boys. These facts were: (1) the higher age range of the secondary school group, and (2) the type of activities used by this higher age range, particularly those in which the factors of height and weight seemed to be more prominent. Their result was the calculation of a best-fit index from the performance records of twenty thousand boys in a wide variety of individual athletic events in five fundamental groupings according to type. The best-fit index was computed from indices obtained from running, jumping, throwing, kicking, and weight and strength activities. The resulting formula was  $2 \times \text{Age in years and months} + .475 \times \text{Height in inches} + .16 \times \text{Weight in pounds}$ . It was adopted in 1935 by the California Interscholastic Federation.

To be more scientific a classification plan should be designed for each year of age and for each event in which the student performs. Such a task would be impractical from an administrative point of view. Neilson (22) found that there was extremely high relationships between the best-fit or general classification system and the specific index at ages below nineteen years. He also noted that specific classification indices for a particular age in two different events had correlation coefficients of between .94 and .99 except in a very few cases, and the average was .95 or better. The Cozens-Trieb-Neilson index was selected as a second type of classification for this normative study.



## CHAPTER III

### METHODS AND PROCEDURES

#### I. THE SAMPLE GROUP

The sample was the male population of boys in the Edmonton Public and Edmonton Separate High Schools who were enrolled in physical education classes during the 1965-1966 school year. A number of students were not included in the sample because of physical defects, injuries, illness and absence.

It was, therefore, not possible to obtain results from the whole high school physical education population. Data were obtained from 2,941 boys ranging from thirteen to twenty-three years of age. Due to the very small number in the lower and upper age ranges it was considered practical to calculate norms for ages fourteen to nineteen years inclusive.

#### II. SELECTION OF ACTIVITIES

It was decided to measure the performance of each boy in one event from each of the following main groupings in track and field:

- (a) Sprint or Dash - One Hundred Yard Dash (on grass)
- (b) Middle Distance Run - One Mile Run (on grass or cinders)
- (c) Jump for Height - Running High Jump (using straddle, scissors or western roll technique)
- (d) Jump for Distance - Running Long Jump (with and without the take-off board)



(e) Throw for Distance - Eight Pound Shot Put (with O'Brien or orthodox style)

### III. CLASSIFICATION FACTORS

Each boy was classified using two different methods. The data were then used to obtain norms for each method.

#### Age

Six age classes of one year intervals ranging from fourteen to nineteen years inclusive constituted one method of grouping the subjects.

#### Age, Height and Weight

The Cozens-Trieb-Neilson Classification Index was selected as the second method of placing the subjects in six groups based on the formula of  $2 \times \text{Age in years and months} + .475 \times \text{Height in inches} + .16 \times \text{Weight in pounds}$ . A chart for determining the exponents for age, height, and weight was used to facilitate the use of the formula. The six groups were as follows:

<u>Index</u> (Sum of Exponents)	<u>Group Number</u>
92 and above	1A
88 - 91	1
83 - 87	2
79 - 82	3
75 - 78	4
70 - 74	5

Group number one normally includes all those who obtain and total index of 88 or more. From the nature of the sample being tested, it was anticipated that a large portion of the boys would be in that range. It was decided to subdivide group one and form another group



called 1A. This group consisted of those boys whose index number was 92 or more while the new group one included those boys whose numbers were 88 to 91 inclusive.

#### IV. PERMISSION TO CONDUCT THE PROJECT

Established channels of procedure were followed in order to obtain permission to conduct this research project. A letter was written to each of the Edmonton Public and the Edmonton Separate School Boards with an accompanying outline of the study, requesting permission to arrange for testing in their respective high schools (see Appendix). Upon written approval from the two school boards, the two Supervisors of Physical Education also gave their approval for the study. A letter was then sent to each of the nine principals of the public schools and the five principals of the separate schools and their respective physical education department heads requesting permission to contact their male physical education teachers in order to complete the testing and obtain the necessary data (see Appendix). Full co-operation was indicated from each of the schools and their staff members. Testing was carried out by thirty-seven of the forty-one physical education teachers for 2,941 boys from thirteen of the fourteen senior high schools in the city of Edmonton. Tables of norms were developed from the data of 2,927 boys. Previously arranged swimming classes during May for some of the classes at three of the schools made it impossible for them to contribute to the testing program. One school had physical education classes scheduled on a two-week period alternating with the girls for



the same amount of time. This made it difficult for them to complete the testing.

#### V. INSTRUCTION OF THE TESTERS

The scope of the testing program made it necessary to obtain the assistance of all the male physical education teachers in the schools to test and submit the data for their own students. Two instructional sessions were held for the purpose of standardizing the procedures for administering the test items, measuring and recording the results. Those teachers who did not attend the sessions were contacted and given all the necessary instructions. Scoring cards and printed instructions were given to all the testers (see Appendix).

#### VI. CALIBRATION OF INSTRUMENTS

All stop-watches used by the testers contained dial markings of one-tenth of a second. The stop-watches were collected and checked for accuracy at the University of Alberta against an electric chronoscope manufactured by the Standard Electric Time Company which had a sweep hand and dial markings to one-hundredth of a second. The time error for a five-minute period was recorded on the back of each watch. A time correction sheet was given to each teacher (see Appendix). However, only those watches found to be accurate within four-tenths of a second for five minutes were used in the testing. Therefore, the correction chart was not used, but is included in the Appendix as a valuable reference table.

Measuring tapes were compared to a one-hundred foot steel tape



and errors in tape length were allowed for in the measurements.

The steel shots were weighed at the University of Alberta on a recently calibrated Toledo "No Springs" Scale (Model No. 15594) having dial markings at one ounce intervals. Only those shots weighing eight pounds were used in the testing. Weighing scales from the medical rooms at the schools were used to weigh the boys. The scales were calibrated by the teachers before weighing the boys.

## VII. THE TESTING TIME

All the tests at each school were administered during the regular physical education class periods. The physical education teachers did the timing and measuring for each performance while students assisted with the scoring and measuring under the directions of the teachers. It was expected that the time required to complete the testing would be greater than when several groups might be tested simultaneously as in a normal class situation. The nature of the study made it necessary to conduct the testing according to prescribed, standardized instructions. It was considered that the value of the study justified the class time required to do the testing. Weiss (32) noted that some physical educators develop a negative attitude toward achievement scales because too much time is required to administer them. Brace (5) promoted the use of achievement standards and cited the advantage that they can be used from day to day to measure student accomplishment as a unit of activity progresses. By this method student performance is actually evaluated as the unit is completed without requiring an additional amount of time at the end for testing. It would appear that this is a



sound educational practice and an efficient method of measuring performance. The norms prepared from this study were designed for use in the class periods by the students and the teachers as an integral part of the track and field program.

#### VIII. THE TESTING SCHEDULE

Weather conditions, length and frequency of class time, size of classes and availability of facilities were factors affecting the testing schedule. In view of the variable nature of the conditions under which the data were collected it should be understood that in future years similar variations in conditions would continue to exist. The results, therefore, should be more meaningful to the physical education teacher than if the study had been conducted in a pure experimental research setting.

The students had participated in track and field activities for two to three weeks prior to the testing period. The schedule was recommended to be followed as closely as possible.

Week of May 9th: - take all ages, heights, and weights and compute the classification indices.

- prepare all facilities and equipment necessary for testing.

- administer the one hundred yard dash and the running long jump.

Week of May 16th: - administer the running high jump, the eight pound shot put and the mile run.

Week of May 23rd: - complete all testing and recording not finished in the first two weeks.

- return all data score cards to L. S. Fairbanks.



## IX. ADMINISTERING THE TESTS

All data were recorded on score cards designed for the study and converted for transfer to IBM punch cards.

### Age

Each boy was asked to answer three questions regarding his age: (a) How old were you (in years only ) on Sunday, May 1st, 1966? (b) What is the day, month, and year of your birth? and (c) What is your age in years and months, to the nearest month, as at May 1st, 1966?

A conversion table was supplied to convert the ages to total months.

### Height

Each boy was measured in inches and halves, to the nearest half-inch. Readings on the scale exactly at the one-quarter and the three-quarter inch marks were taken to the next half-inch above. The boys were measured in their bare feet.

### Weight

Each boy was weighed to the nearest pound with his clothing removed.

### Motivation

Teachers were instructed to explain to their students the purpose of the project and answer any questions about the study. The boys were asked to attempt their very best performance in each event. Teachers encouraged a spirit of rivalry and competition between individuals, classes, and other schools. Teachers and students gave verbal encouragement during the events to inspire the boys to produce their maximum



efforts.

#### Warm-Up Prior to Testing

No attempt was made to standardize the warm-up activities. Teachers were requested to conduct a five-minute warm-up appropriate for the particular events being tested.

#### One Hundred Yard Dash

Each student ran one hundred yards on a grass surface, while wearing gymnasium type shoes. Wherever wind was a factor, students ran in a cross-wind direction. The starter's commands were "On your marks," "Set," "Go." The starter brought his raised arm down sharply from a position above shoulder level and at the same instant shouted the command, "Go." Each boy selected a classmate of approximately equal speed to run against him. All races were run in pairs with one watch used by the teacher to time each runner. All times were recorded to one-tenth of a second. Each runner was allowed two trials and the better time was taken as his score.

#### One Mile Run

Each student ran a distance of one mile either on cinders or grass wearing gymnasium type shoes. Times were recorded to the nearest second. It was recommended that the classes be divided into three groups. Each student in each group was assigned a partner from each of the other two groups. The sequence for the groups is shown as follows:



<u>Heat No.</u>	<u>Group I</u>	<u>Group II</u>	<u>Group III</u>
Warm-up 5 minutes			
1.	Run one mile	Warm-up 5 minutes and help timer	Timer
2.	Timer	Run one mile	Warm-up 5 minutes, and help timer
3.	Help the timer	Timer	Run one mile

Where class time would not permit three heats, it was recommended that students be divided into two groups for running and timing the mile.

One watch was used by the teacher for all the timing. The students who were acting as timers were instructed to listen for their partner's time as he crossed the finish line. The teacher started the event using the same commands as in the one hundred yard dash.

Encouragement was given by the timing groups as the runners passed the starting point for each lap of the race. Lap times were given by the teacher timer as the runners passed the starting point. During the final lap the student timers were instructed to remain silent and listen carefully to the timer. The teacher stood at the finish line and called out the seconds as they elapsed on the stop-watch. The last time given before the runner crossed the finish line was recorded on the score card in minutes and seconds and later converted to total seconds.

#### Running High Jump

A running approach and a one-foot take-off constituted a legal jump. All jumpers wore gymnasium type shoes. Knocking the bar off the supports counted as a failure. Touching the ground beyond the plane of the uprights with any



part of the body counted as a jump. Three consecutive failures, regardless of the height at which they occurred, terminated each boy's performance. His best jump was recorded to the nearest half-inch. Care was taken to keep the bar straight and horizontal. The upper and front surfaces of the cross bar were marked and the bar was always placed on the uprights in the same manner. The height of the bar was recorded for each time the bar was raised. Measurements were made perpendicular from the ground to the lowest part of the upper edge of the bar. The jumping style of each boy was also recorded as either straddle, scissors or western roll.

#### Running Long Jump

A total of six jumps were recorded for each boy. The first three trials were measured from the point of take-off to the point of landing without regard for the take-off board ruling. The next three measured trials were taken with regard for the take-off board ruling. Foul jumps were, therefore, not measured but additional trials were allowed for each foul jump so that each boy obtained three long jump measures from the board. Each jump was measured to the nearest inch. The longest jumps recorded for each of the two series of three jumps were converted to total inches and taken as the best jumps.

#### Eight Pound Shot Put

A shot weighing eight pounds was put from a circle having a diameter of seven feet and an attached stop board at the front. Each boy was given three recorded trials. Foul throws were not measured but additional throws were allowed for each foul until three throws were



recorded. Each put was measured to the nearest inch. The best put was converted to total inches and used as the student's score.

#### Retest Group for Reliability

The retest group consisted of ninety boys from nine of the twelve grade ten classes at Ross Sheppard Composite High School. The boys were randomly assigned to repeat the testing program by their physical education teachers. Ten boys were assigned from each of nine different classes. All of the retesting was done by the writer during the students' regular class periods while the remainder of the class participated in tennis and softball. Only ten of the retest group were tested both times by the same teacher.

Some of the boys evidenced dissatisfaction toward the retest while others welcomed the assignment. It was not possible to determine the effect of attitude on the performances of the retest group.

Retesting commenced as soon as the classes were finished the original testing schedule. This was two weeks after the first tests began for four of the groups, and three weeks after the first tests began for the other five groups. Pearson product-moment correlation coefficients were calculated for each of the test items.

#### X. VERIFICATION OF THE DATA

A number of teachers were visited during the actual testing schedule. Observations from the visits indicated that correct procedures were being followed. Others were contacted by telephone to check on the progress of the testing program and to clear up administrative problems



that were encountered.

As the data score cards were returned to the writer, all the calculations and conversions were checked. Wherever information was lacking or appeared to be incorrect, the teachers were contacted to assist with the corrections. In those instances where birthdates and age data did not agree, the birthdates were verified from the school records.

One teacher neglected to mark the style used in throwing the shot put for ninety-eight boys. Their scores were included for the shot put event but they could not be considered in the comparison of the two specified styles. They were treated separately as an uncoded style group.

## XI. TREATMENT OF THE DATA

### IBM Card Punching and Sorting

Data for 2,927 boys were carefully checked and transferred onto IBM punch cards in order to facilitate sorting, counting, and tabulating frequencies. A number coding system was used to identify each card by school, teacher, grade, and pupil.

The cards were first sorted into the six age groups. Performance data for each age group were then sorted for each test item. Frequencies were tabulated for each test item on a special tally sheet according to the size of the unit of measurement for each activity.

The cards were next sorted into six groups according to the Cozens-Trieb-Neilson Classification method. Each of these classes was sorted for each test item and frequencies were again recorded on the



appropriate tally sheets.

The cards were sorted, counted and tabulated a total of thirty times during the process of completing the tally sheets for computing the percentiles.

### Computing Percentiles

Cumulative totals were obtained for each test item by adding the frequencies that had been tabulated on the tally sheets. Cumulative frequencies at every fifth percentile level were calculated according to the total number of observations in each test item. The exact performance score value for each percentile level was read directly from the table. An example of this procedure is included in the Appendix.

### IBM 7040 Computer Calculations

Each of the six age groups was put through the computer at the University of Alberta. The output for each of the thirteen items for each group included a histogram, size of the sample, minimum and maximum scores, range, interval size, median, mean, standard deviation, variance, skewness and kurtosis. It also reported a cumulative frequency per cent of observations at each interval which served as a valuable check for the percentile norms.

In order to accommodate the width of the computer's output sheets for the histograms, the interval sizes had to be increased from one to five seconds in the one mile run, from one to two inches in the long jump, and from one inch to five inches in the shot put event.

Some of the output from this program was not required for the



purposes of this study; they were retained for possible future reference.

### Mean Comparisons

From the results it was possible to compare the means in the following events:

- (a) one mile run on cinders and on grass;
- (b) running high jump using straddle, scissors and western roll styles;
- (c) running long jump with and without the take-off board ruling;
- (d) eight pound shot put using the O'Brien and the older orthodox styles.



## CHAPTER IV

### RESULTS AND DISCUSSION

#### I. DESCRIPTION OF THE TEST RESULTS

At the conclusion of the testing schedule, completed data score cards were obtained from the testers. Thirty-seven of the forty-one male physical education teachers from thirteen of the fourteen senior high schools participated in the testing program. Data for age, height and weight, and at least one or more performance scores were obtained for a total of 2,941 boys ranging in age from 13 to 23 years as at May 1st, 1966. Table I shows the number in each age group for the test group and the retest group. It should be noted that ages 13, 20, 21, 22, and 23 years did not have a sufficient number of subjects to make it practical to calculate norms. Percentile norms were calculated from the data of the remaining 2,927 boys ranging in age from 14 to 19 years inclusive.

Table II indicates the distribution of the subjects according to the Cozens-Trieb-Neilson Classification system. Normally class number I includes those boys having a total index of 88 or more. However, when it was discovered that over one-half of the boys (1,522) were within this index range, it was decided to subdivide class number I and form class IA as shown the table.

Every boy listed on the score cards who had complete information for age, height, weight, and one or more performance scores was included



TABLE I

AGE DISTRIBUTION OF BOYS TESTED IN EDMONTON HIGH SCHOOLS, MAY, 1966

Age	Number of Subjects		Retest Group
	Test Group Included	Discarded	
13		1	
14	47		1
15	1,172		56
16	1,047		31
17	427		1
18	184		1
19	50		
20		10	
21		2	
22		--	
23		1	
Total	2,927	14	90

TABLE II

DISTRIBUTION OF BOYS TESTED IN EDMONTON HIGH SCHOOLS, MAY, 1966 BASED ON COZENS-TRIEB-NEILSON CLASSIFICATION INDEX

Index (Sum of Exponents)	Class Number	Test Group	Retest Group
70-74	5	13	--
75-78	4	86	7
79-82	3	327	16
83-87	2	979	36
88-91	1	875	24
92+	1A	647	7
Total		2,927	90



in the study. Table III shows the number and per cent of the boys who were tested in each activity. The range of participation for the 2,927 boys was from 91 per cent in the one mile run to 94 per cent in the running long jump. Blanks in the data occurred because of illnesses, injuries and absences during the test period.

The score cards also included a total of 130 boys not included in this study. Sixty-one boys were not fully classified, fifty-one had injuries that were serious enough to either reduce their performance or make it impossible for them to compete, and eighteen had discontinued their attendance at school.

An additional 222 boys from three of the high schools were not tested due to a conflict with previously arranged swimming classes. A total of 3,275 boys were still enrolled in physical education classes at the time of testing. Data were obtained for 2,941 of these subjects and the norms were calculated from the performance scores of 2,927 boys. This represented ninety per cent of the total population. It is the opinion of the writer that the results of the ninety per cent do represent the results of the population.

Table IV shows the distribution of testers and subjects by schools according to grade as they were received at the completion of the testing period.

## II. WEATHER CONDITIONS

Weather reports for the city of Edmonton during the month of May, which included the testing period for this study, indicated that the average temperature was 54.3 degrees, or two degrees above normal. The



TABLE III

NUMBERS AND PERCENTAGES OF BOYS WHO PERFORMED EACH EVENT IN THE  
 TRACK AND FIELD NORMATIVE STUDY, MAY, 1966  
 EDMONTON SENIOR HIGH SCHOOLS

	100 Yard Dash	One Mile Run Both Cinders	Run Grass	High Jump Styles	Straddle Style	Scissors Style	Western Style	Without Board	With Board	Running Long Jump Styles	Eight Pound Shot Styles	Put All Styles	Put O'Brien Styles	Put Ortho. Styles
No Data	202	254	-	-	210	-	-	-	222	179	231	-	-	-
Data	2725	2673	1647	1026	2717	868	1702	147	2705	2748	2696	593	2005	98
Total	2927	2927	1647	1026	2927	868	1702	147	2927	2927	2927	593	2005	98
% Tested	93%	91%	62%	38%	93%	32%	63%	5%	92%	94%	92%	22%	74%	4%



TABLE IV

DISTRIBUTION OF TESTERS AND SUBJECTS BY SCHOOLS ACCORDING TO GRADE  
EDMONTON SENIOR HIGH SCHOOLS

School	Teacher Testers	Number of Subjects			Total
		X	XI	XII	
Bonnie Doon	3	252	35	26	313
Eastglen	3	185	52	9	246
Jasper Place	3	274	64	37	375
McNally	2	123	22	6	151
Queen Elizabeth	4	233	26	2	261
Ross Sheppard	5	324	68	4	396
Strathcona	3	255	88	5	348
Victoria	5	281	85	43	409
Sub-total	28	1,927	440	132	2,499
Austin O'Brien	2	75	43	1	119
O'Leary	2	73	-	-	73
St. Francis Xavier	3	103	-	-	103
St. Joseph's	1	50	17	-	67
St. Mary's	1	80	-	-	80
Sub-total	9	381	60	1	442
TOTAL	37	2,308	500	133	2,941

total rainfall was only 1.11 inches, lower than the normal of 1.83 inches, and the wind speed increased more than 10 per cent to 11.7 miles per hour. The testing schedule which was originally planned to commence on May 2nd was postponed for one week due to wind conditions and cool temperatures. To minimize the effect of the wind on the testing program, teachers were instructed to adjust the schedule in order to avoid track events on windy days. Where this was not possible, the events were administered in a cross-wind direction.



### III. PERCENTILES

It was decided to calculate the norms in the form of percentiles. They are easily understood by students, parents and teachers. In the tables that follow, the performance scores are percentile points and the corresponding values on the transformed scale are percentile ranks. For example, if 75 per cent of the boys scored less than 11.6 seconds in the 100-yard dash, then 11.6 is the 75th percentile point and 75 is the corresponding percentile rank.

Garrett (15) showed that it is unsound to average a person's percentile rankings on several items unless the rankings lie between the twenty-fifth and seventy-fifth percentile points. It is a characteristic of percentiles that equal groups of subjects do not represent equal increments of achievement. The increments increase rapidly beyond the interquartile range. The following information, taken from Table XII, one mile run for age 16 boys, is a good illustration:

<u>Percentile Rank Interval</u>	<u>Performance Increment</u>	<u>Percentile Rank Interval</u>	<u>Performance Increment</u>
	Min: Secs		Min: Secs
0 - 5th	4:38	55th - 65th	0:10
5th- 15th	1:22	65th - 75th	0:11
15th- 25th	0:25	75th - 85th	0:11
25th- 35th	0:13	85th - 95th	0:22
35th- 45th	0:12	95th - 100th	0:47
45th- 55th	0:10		

It should also be noted that the performance score shown for either the zero or the hundredth percentile point in each table represents the achievement of one boy in each case. These scores simply represent the best and poorest performances of specific individuals.



#### IV. SCORING TABLES BASED ON AGE

The following scoring tables represent the present level of performance of boys taking physical education classes in Edmonton high schools. They do not characterize any desirable or acceptable standard of performance in track and field. It is intended that the tables will be used by students and teachers to recognize ability in track and field and motivate for improvement and revision of the present norms.

##### Use of the Scoring Tables

Tables V to IX and XVI to XX inclusive are designed to show the trend in performance scores of each event from one age group to another and for each of the six classes based on age, height, and weight. Comparisons can be made within the same group and between the different groups. For example, a fourteen year old boy who can high jump four feet four inches is better than 75 per cent of his own age group. From the same table he can see where his performance ranks with all the other age groups.

Tables X to XV and XXI to XXVI inclusive are designed for use as "profile charts." The chart selected would depend on the method of classification being used. Each person would circle the performance scores obtained in each of the test items attempted. Where the exact score is not included in the table it should be inserted between the two nearest scores and circled. The percentile rank may be interpolated for that score. When the circled scores are joined by straight lines the result is a "performance profile" showing relative strengths and



weaknesses by the high and low positions on the chart. Table X includes an example of possible profile markings. Personal profile grid charts may also be designed to record the percentile rank for each event.

Percentile point scores have been included for the various styles in the high jump and shot put events, and the type of running surface for the one mile run.

The norms can be used for diagnostic purposes by students and teachers. They can serve as a motivating instrument for self-improvement in track and field through practice and competition. Individual and group comparisons are additional uses for the norms. A teacher may wish to compare the performance of a class with the established norms.



TABLE V

 100 YARD DASH PERCENTILE SCORES FOR BOYS BASED ON AGE  
 EDMONTON SENIOR HIGH SCHOOLS

Percen- tile	Age in Years as at May 1st, 1966				
	14	15	16	17	18
100	11.7	11.0	10.7	10.4	11.0
95	12.2	11.8	11.5	11.3	11.4
90	12.4	12.0	11.8	11.6	11.6
85	12.6	12.2	12.0	11.7	11.7
80	12.7	12.4	12.1	11.9	11.9
75	13.0	12.5	12.2	12.0	12.0
70	13.1	12.6	12.4	12.1	12.0
65	13.5	12.8	12.5	12.2	12.1
60	13.7	12.9	12.6	12.3	12.2
55	13.7	13.0	12.6	12.4	12.4
50	13.8	13.1	12.8	12.5	12.5
45	14.0	13.2	12.9	12.6	12.5
40	14.1	13.3	13.0	12.8	12.6
35	14.3	13.5	13.1	12.9	12.7
30	14.5	13.6	13.2	13.0	12.8
25	14.7	13.7	13.4	13.2	12.9
20	14.8	13.9	13.5	13.3	13.2
15	15.2	14.2	13.8	13.5	13.4
10	15.5	14.5	14.0	13.8	13.7
5	17.0	15.0	14.6	14.4	14.2
0	17.4	19.5	18.0	15.8	16.0
N	43	1,120	991	384	149
Range	5.7	8.5	7.3	5.4	5.0
Mean	14.0	13.2	12.9	12.6	12.6
S.D.	1.34	1.03	.98	.92	.91
					1.01



TABLE VI

 ONE MILE RUN PERCENTILE SCORES FOR BOYS BASED ON AGE  
 EDMONTON SENIOR HIGH SCHOOLS

Percen- tile	Age in Years as at May 1st, 1966					19
	14	15	16	17	18	
100	5:49	5:15	4:59	5:16	5:14	5:45
95	6:03	5:49	5:45	5:39	5:39	5:46
90	6:13	6:02	5:56	5:49	5:49	5:47
85	6:23	6:10	6:05	5:59	6:00	5:52
80	6:28	6:17	6:12	6:03	6:09	6:10
75	6:36	6:22	6:17	6:11	6:14	6:13
70	6:40	6:27	6:22	6:16	6:18	6:21
65	6:44	6:32	6:28	6:22	6:20	6:24
60	6:45	6:38	6:33	6:27	6:28	6:41
55	6:50	6:42	6:38	6:32	6:31	6:43
50	6:56	6:48	6:42	6:37	6:39	6:50
45	7:00	6:53	6:49	6:44	6:44	7:00
40	7:06	7:00	6:57	6:51	6:48	7:08
35	7:08	7:08	7:02	6:59	6:59	7:15
30	7:15	7:13	7:08	7:05	7:06	7:19
25	7:31	7:20	7:17	7:15	7:23	7:42
20	7:40	7:28	7:27	7:29	7:35	7:45
15	7:50	7:36	7:42	7:44	7:57	8:12
10	8:28	7:54	8:04	8:17	8:30	8:34
5	9:15	8:30	8:47	9:06	9:26	9:58
0	9:41	13:20	13:40	11:05	11:55	10:57
N	40	1,085	967	387	156	38
Range	3:52	8:05	8:41	5:49	6:41	5:12
Mean	7:05	6:55	6:54	6:52	6:56	7:04
S.D.	51.4	49.7	58.2	1:02.2	11:08.8	1:09.6



TABLE VII

RUNNING HIGH JUMP PERCENTILE SCORES FOR BOYS BASED ON AGE  
EDMONTON SENIOR HIGH SCHOOLS

Percen- tile	Age in Years as at May 1st, 1966					19
	14	15	16	17	18	
100	5-1	5-5	5-8	5-9	5-7	5-7
95	4-7	4-10	4-11	5-1	5-3	5-4
90	4-6	4-8.5	4-10	4-11	5-1	5-3
85	4-5	4-7	4-8	4-9.5	4-11	4-10
80	4-5	4-6	4-7.5	4-8	4-9.5	4-9
75	4-4	4-5	4-6.5	4-8	4-8	4-8
70	4-2	4-4	4-6	4-6	4-7	4-8
65	4-1	4-4	4-5	4-6	4-6	4-6
60	4-1	4-3	4-4	4-6	4-6	4-6
55	3-11	4-2	4-4	4-5	4-5	4-5
50	3-11	4-2	4-3	4-4	4-4	4-4.5
45	3-10.5	4-1	4-3	4-4	4-4	4-4
40	3-10	4-1	4-2	4-3	4-3	4-2
35	3-9	4-0	4-1	4-2	4-2	4-2
30	3-9	3-11	4-1	4-1.5	4-1.5	4-1
25	3-8	3-10	4-0	4-1	4-1	4-1
20	3-7.5	3-9	3-11	4-0	3-11	4-0
15	3-7	3-8	3-9.5	3-11	3-10	3-11
10	3-5	3-7	3-8	3-10	3-7	3-10.5
5	3-3	3-5	3-6	3-7.5	3-5.5	3-6
0	2-6	2-8	2-6	2-10	2-11	3-5
N	43	1,098	984	394	160	38
Range	2-7	2-9	3-2	2-11	2-8	2-2
Mean	3-11.3	4-1.7	4-3.0	4-4.2	4-4.2	4-4.8
S.D.	5.68	5.32	5.28	5.20	6.35	6.05



TABLE VIII

RUNNING LONG JUMP PERCENTILE SCORES FOR BOYS BASED ON AGE  
EDMONTON SENIOR HIGH SCHOOLS

Percen- tile	Age in Years as at May 1st, 1966					19
	14	15	16	17	18	
100	15-10	18-0	18-5	19-11	17-4	17-2
95	15-0	15-7	16-1	16-5	16-4	16-6
90	14-11	15-0	15-5	15-10	15-8	16-0
85	13-11	14-7	15-1	15-6	15-3	15-10
80	13-8	14-4	14-11	15-2	14-11	15-8
75	13-6	14-0	14-7	15-0	14-10	15-5
70	13-4	13-10	14-5	14-9	14-9	15-3
65	13-0	13-8	14-3	14-7	14-6	15-2
60	12-11	13-6	14-0	14-4	14-4	14-10
55	12-9	13-4	13-10	14-2	14-2	14-4
50	12-8	13-1	13-8	13-10	14-0	14-2
45	12-0	12-11	13-5	13-8	13-10	14-1
40	11-11	12-8	13-3	13-5	13-7	14-0
35	11-5	12-6	13-0	13-2	13-5	13-8
30	11-2	12-4	12-9	13-0	13-2	13-8
25	10-11	12-2	12-6	12-10	12-10	13-2
20	10-9	11-11	12-3	12-6	12-7	13-0
15	10-4	11-6	12-0	12-4	12-2	12-8
10	10-2	11-2	11-6	12-0	11-9	12-6
5	9-5	10-5	10-9	11-6	10-11	10-8
0	9-3	7-6	6-10	8-0	8-5	10-0
N	43	1,118	990	395	162	40
Range	6-7	10-6	11-7	11-11	8-11	7-2
Mean	12-4	13-1	13-7	13-11	13-10	14-4
S.D.	1-8.6	1-6.5	1-7.2	1-7.3	1-7.2	1-7.2



TABLE IX

 EIGHT POUND SHOT PUT PERCENTILE SCORES FOR BOYS BASED ON AGE  
 EDMONTON SENIOR HIGH SCHOOLS

Percentile	Age in Years as at May 1st, 1966					
	14	15	16	17	18	19
100	41-1	48-10	49-4	47-11	48-6	44-4
95	36-2	37-10	39-7	41-8	43-2	43-3
90	33-7	36-2	37-10	39-10	40-10	42-6
85	32-8	35-0	36-9	38-11	40-0	41-2
80	31-0	34-0	35-11	37-11	39-2	40-6
75	30-9	33-2	35-3	37-0	38-3	39-7
70	29-9	32-6	34-5	36-4	37-9	38-8
65	29-1	31-11	33-9	35-8	37-6	38-6
60	29-0	31-2	33-2	35-1	37-0	38-4
55	27-8	30-9	32-7	34-9	36-8	38-0
50	36-8	30-3	32-0	34-4	35-9	36-0
45	26-3	29-8	31-4	33-9	35-0	35-9
40	25-11	29-0	30-9	33-1	34-7	35-7
35	25-0	28-5	30-3	32-9	33-9	35-6
30	24-10	27-10	29-8	32-2	33-3	34-7
25	24-9	27-2	29-0	31-4	32-5	34-0
20	24-4	26-6	28-1	30-8	31-7	33-1
15	23-9	25-6	27-3	29-4	30-11	31-9
10	21-9	24-6	26-2	28-8	29-11	30-8
5	19-11	23-1	24-7	27-0	28-2	27-2
0	17-6	17-0	17-4	19-3	22-3	23-6
N	42	1,080	984	392	157	41
Range	23-7	31-10	32-0	28-8	26-3	20-10
Mean	27-7.4	30-3.2	32-0.8	34-2.1	35-6.7	36-4.7
S.D.	4-11.7	4-6.5	4-7.0	4-5.3	4-6.1	4-10.4



TABLE X

TRACK AND FIELD PERCENTILE SCORES FOR BOYS AGED 14 AS AT MAY 1st, 1966  
EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	Yard Dash	100 On Both Cinders	One Mile Run On Grass	High Jump				Long Jump				Eight Pound Shot Put			
				All Styles		Straddle Scissors Western		No Board		With Board		All Styles		O'Brien Orthodox	
				Style	Style	Style	Style	Feet	Inches	Style	Style	Style	Style	Feet-Inches	
100	11.7	5:49	5:49	6:02	5-1	4-6.5	5-1	4-7	15-10	15-10	41-1	36-2	41-1	33-7	
95	12.2	6:03	6:03	6:02	4-7	4-6.5	4-7	4-7	15-3	15-0	36-2	36-8	33-7	33-7	
90	12.4	6:13	6:05	6:13	4-6	4-6	4-5	4-7	15-0	14-11	36-2	33-7	33-7	33-7	
85	12.6	6:23	6:14	6:23	4-5	4-6	4-5	4-7	14-3	13-11	32-8	36-2	32-2	33-7	
80	12.7	6:28	6:28	6:24	4-5	4-2	4-5	4-7	14-2	13-8	31-0	36-2	30-9	33-7	
75	13.0	6:36	6:42	6:30	4-4	4-4	4-4	4-2	13-6	13-9	30-9	26-8	30-9	33-7	
70	13.1	6:40	6:45	6:30	4-2	4-1	4-2	4-1	13-5	13-4	29-9	26-8	29-7	33-7	
65	13.5	6:44	6:46	6:39	4-1	4-1	4-1.5	4-1	13-4	13-0	29-1	26-8	29-0	29-9	
60	13.7	6:45	6:50	6:40	4-1	4-0	4-1	4-1	13-2	12-11	29-0	26-8	28-0	29-9	
55	13.7	6:50	6:56	6:44	3-11	4-0	3-11	4-7	12-10	12-9	27-8	26-8	27-8	29-9	
50	13.8	6:56	7:02	6:45	3-11	3-11	3-11	3-8	12-10	12-8	26-9	22-10	26-8	29-9	
45	14.0	7:00	7:07	6:45	3-10.5	3-10.5	3-10.5	3-9	12-8	12-7	26-3	22-10	26-3	29-9	
40	14.1	7:06	7:08	6:51	3-10	3-10.5	3-10.5	3-9	12-6	11-11	25-11	22-10	25-11	29-9	
35	14.3	7:08	7:11	7:00	3-9	3-9	3-9	3-9	12-4	11-5	25-0	22-10	25-6	29-9	
30	14.5	7:15	7:15	7:06	3-9	3-9	3-9	3-8	12-1	11-2	24-10	22-10	24-10	18-6	
25	14.7	7:31	7:45	7:25	3-8	3-7.5	3-8	3-9	11-9	10-11	24-9	17-6	24-10	18-6	
20	14.8	7:40	7:50	7:25	3-7.5	3-7.5	3-7	3-9	11-5	10-9	24-4	17-6	24-9	18-6	
15	15.2	7:50	8:24	7:31	3-7	3-7	3-5	3-9	11-5	10-4	23-9	17-6	24-4	18-6	
10	15.5	8:28	8:35	7:40	3-5	3-7	3-3	3-9	11-2	10-2	21-9	17-6	23-9	18-6	
5	17.0	9:15	9:15	8:28	3-3	3-5.5	3-3	3-9	10-2	9-5	19-11	17-6	21-6	18-6	
0	17.4	9:41	9:41	8:28	2-6	3-5.5	2-6	3-9	9-10	9-3	17-6	17-6	19-11	18-6	
N	43	40	24	16	43	11	30	2	43	42	4	35	3		
Range	5.7	3:52	3:52	2:26	2-7	1-1	0-10	6-0	6-7	23-7	18-8	21-2	15-1		
Mean	14.0	7:05	7:13	6:54	3-11.3	3-11.5	3-11.1	4-2.0	12-10	12-4	27-7.4	25-9.5	27-10.3	27-3.3	
S.D.	1.34	51.4	58.5	37.3	5.68	4.24	6.19	7.07	1-5.5	1-8.6	4-11.7	7-10.5	4-6.1		



TABLE XI

TRACK AND FIELD PERCENTILE SCORES FOR BOYS AGED 15 AS AT MAY 1st, 1966  
EDMONTON SENIOR HIGH SCHOOLS

Per-Centile	100 Yard Dash Secs.	One Mile Run		High Jump			Long Jump			Eight Pound Shot Put		
		On Both	On Cinders	All Styles	Straddle Style	Scissors Style	Western Style	No Board	With Board	All Styles	O'Brien Style	Orthodox Style
		Minutes:	Seconds:	Feet-inches	Feet-inches	Feet-inches	Feet-inches	Feet-Inches	Feet-Inches	Feet-Inches	Feet-Inches	Feet-Inches
100	11.0	5:15	5:15	5:20	5:5	5:4	5:5	18-0	18-0	48-10	43-10	39-4
95	11.8	5:49	5:50	5:47	4-10	4-11	5-3	16-4	15-7	37-10	38-11	38-8
90	12.0	6:02	6:04	5:59	4-8.5	4-9	4-8	15-6	15-0	36-2	37-2	37-9
85	12.2	6:10	6:13	6:06	4-7	4-7	4-7	15-1	14-7	35-0	36-7	36-5
80	12.4	6:17	6:18	6:14	4-6	4-6	4-6	14-9	14-10	34-0	35-4	35-0
75	12.5	6:22	6:22	6:22	4-5	4-6	4-5	14-7	14-0	33-2	34-10	34-0
70	12.6	6:27	6:28	6:27	4-4	4-5	4-4	14-4	13-10	32-6	34-1	32-10
65	12.8	6:32	6:33	6:31	4-4	4-4	4-3	14-2	13-8	31-11	33-8	31-5
60	12.9	6:38	6:40	6:35	4-3	4-3	4-2.5	14-0	13-6	31-2	32-11	31-5
55	13.0	6:42	6:43	6:40	4-2	4-2	4-2	13-10	13-4	30-9	32-6	32-4
50	13.1	6:48	6:48	6:48	4-2	4-2	4-1	13-4	13-10	30-9	30-6	29-6
45	13.2	6:53	6:52	6:54	4-1	4-2	4-1	13-7	13-1	30-3	32-0	28-9
40	13.3	7:00	6:59	7:01	4-1	4-1	4-0	13-5	12-11	29-8	30-9	29-4
35	13.5	7:08	7:06	7:10	4-0	4-0.5	4-0	13-3	12-8	29-0	30-3	28-0
30	13.6	7:13	7:13	7:15	3-11	3-11.5	3-11	13-0	12-6	28-5	29-3	28-4
25	13.7	7:20	7:19	7:21	3-10	3-10	3-10	12-10	12-4	27-10	28-8	27-9
20	13.9	7:28	7:27	7:29	3-9	3-9	3-9	12-4	11-11	26-6	27-2	24-10
15	14.2	7:36	7:36	7:36	3-8	3-8	3-10	11-11	11-6	25-6	26-10	24-7
10	14.5	7:54	7:54	7:53	3-7	3-7	3-8	11-7	11-2	24-6	25-10	23-11
5	15.0	8:30	8:39	8:23	3-5	3-5	3-3	11-0	10-5	23-1	24-9	21-1
0	19.5	13:20	13:20	10:04	2-8	2-8	2-10	3-1	7-3	7-6	17-0	19-7
N	1120	1085	607	478	1098	336	706	56	1109	1118	1080	199
Range	8.5	8:05	8:05	4:44	2-9	2-8	2-6	2-4	10-9	10-6	31-10	40
Mean	13.2	6:55	6:57	6:54	4-1.7	4-2.0	4-1.4	4-3.4	13-7	13-1	30-3.2	19-9
S.D.	1.03	49.7	51.9	46.9	5.32	5.52	5.11	6.21	1-6.3	1.6.5	4-6.5	30-0.9
											4-5.5	4-5.5



TABLE XII

TRACK AND FIELD PERCENTILE SCORES FOR BOYS AGES 16 AS AT MAY 1st, 1966  
EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	100 Yard Dash Secs	One Mile Run			High Jump			Long Jump			Eight Pound Shot Put				
		On Both Cinders	On Grass	Minutes; seconds	All Styles	Straddle Style	Scissors Style	Western Style	No Board	With Board	Style	All 1 Styles	O'Brien Style	Orthodox Style	Not Coded
				Feet-inches				Feet-inches			Feet-inches			Feet-inches	
100	10.7	4:59	4:59	5:22	5-8	5-6	5-8	5-3	18-3	49-4	49-4	46-0	39-7		
95	11.5	5:45	5:46	5:40	4-11	5-0.5	4-10.5	5-2.5	16-7	39-7	40-11	39-1	39-1		
90	11.8	5:56	6:01	5:50	4-10	4-11	4-8.5	5-0	16-1	37-10	38-11	37-4	37-10		
85	12.0	6:05	6:08	5:59	4-8	4-9.5	4-7.5	4-11	15-8	36-9	38-1	36-3	34-2		
80	12.1	6:12	6:13	6:06	4-7.5	4-8.5	4-6	4-9	15-5	35-11	36-10	35-7	33-9		
75	12.2	6:17	6:19	6:13	4-6.5	4-8	4-5.5	4-8	15-2	14-7	35-3	36-2	34-9	32-2	
70	12.4	6:22	6:25	6:18	4-6	4-7	4-5	4-8	15-0	14-5	34-5	35-8	34-2	31-4	
65	12.5	6:28	6:30	6:23	4-5	4-6	4-4	4-5	14-9	14-3	33-9	35-1	33-8	30-6	
60	12.6	6:33	6:36	6:28	4-4	4-5.5	4-4	4-4	14-6	14-0	33-2	34-4	33-0	30-5	
55	12.6	6:38	6:40	6:34	4-4	4-5	4-3	4-3.5	14-4	13-10	32-7	33-7	32-3	30-0	
50	12.8	6:42	6:45	6:40	4-3	4-4.5	4-2.5	4-2.5	14-6	14-0	32-0	33-0	31-9	29-11	
45	12.9	6:49	6:50	6:48	4-3	4-4	4-2	4-3.5	13-11	13-5	31-4	32-6	31-0	29-1	
40	13.0	6:57	6:58	6:56	4-2	4-3	4-1	4-2	13-9	13-3	30-9	31-10	30-7	28-3	
35	13.1	7:02	7:02	7:03	4-1	4-2.5	4-1	4-1	13-7	13-0	30-3	31-6	30-0	28-1	
30	13.2	7:08	7:07	7:10	4-1	4-1.5	4-0	4-1	13-4	12-9	29-8	30-8	29-4	26-11	
25	13.4	7:17	7:15	7:19	4-0	4-0	3-11	4-0.5	13-2	12-6	29-0	30-3	28-9	26-10	
20	13.5	7:27	7:26	7:28	3-11	3-11	3-11	3-11	12-3	28-1	29-3	27-11	25-1		
15	13.8	7:42	7:40	7:42	3-9.5	3-9	3-9.5	3-11	12-6	12-0	27-3	28-7	26-11	24-8	
10	14.0	8:04	8:05	8:04	3-8	3-8	3-8	3-8	12-0	11-6	26-2	27-4	25-11	23-6	
5	14.6	8:47	9:02	8:38	3-6	3-7	3-5	3-6.5	11-2	10-9	24-7	26-1	24-4	23-3	
0	18.0	13:40	13:40	10:23	2-6	3-0	2-6	3-1	7-6	6-10	17-4	21-8	17-4	23-1	
N	991	967.	590	377	984	343	582	59	979	990	984	245	710	29	
Range	7.3	8:41	8:41	5:01	3-2	2-6	3-2	2-2	10-9	11-7	32-0	27-8	28-8	16-6	
Mean	12.9	6:54	6:57	6:51	4-3.0	4-4.0	4-2.4	4-3.8	14-1	13-7	32-0.8	33-3.6	31-8.8	29-9.1	
S.D.	.98	58.2	1:0.5	54.1	5.28	5.38	5.09	5.71	1-7.2	1-7.0	4-7.5	4-5.8			



TABLE XIII

TRACK AND FIELD PERCENTILE SCORES FOR BOYS AGED 17 AS AT MAY 1st, 1966  
EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	100 Yard Dash Secs.	One Mile Run		High Jump			Long Jump			Eight Pound Shot Put			
		On Both Cinders	On Grass	All Styles	Straddle Style	Scissors Style	Western Style	No Board	With Board	All Styles	O'Brien Styles	Orthodox Styles	Not Coded
		Minutes: seconds		Feet-inches				Feet-inches		Feet-inches	Feet-inches	Feet-inches	
100	10.4	5:16	5:16	5:25	5-9	5-3	5-5	19-3	19-11	47-11	43-10	41-5	
95	11.3	5:39	5:37	5:39	5-1	5-2	4-11	17-1	16-5	41-8	43-7	41-5	
90	11.6	5:49	5:45	5:57	4-11	5-0	4-9	16-6	15-10	39-10	42-1	39-4	38-5
85	11.7	5:59	5:55	6:01	4-9.5	4-11	4-8	16-2	15-6	38-11	40-6	38-0	38-5
80	11.9	6:03	6:01	6:16	4-8	4-10	4-8	15-9	15-2	37-11	39-2	37-3	38-4
75	12.0	6:11	6:08	6:20	4-8	4-9	4-7	15-6	15-0	37-0	38-4	36-6	38-0
70	12.1	6:16	6:12	6:24	4-6	4-8	4-6	15-3	14-9	36-4	37-9	35-8	38-0
65	12.2	6:22	6:19	6:25	4-6	4-7	4-5	15-0	14-7	35-8	36-11	35-0	38-0
60	12.3	6:27	6:26	6:30	4-6	4-6	4-4.5	14-10	14-4	35-1	36-4	34-7	36-1
55	12.4	6:32	6:30	6:39	4-5	4-6	4-4	14-8	14-2	34-0	35-10	34-2	36-1
50	12.5	6:37	6:34	6:43	4-4	4-6	4-4	14-5	13-10	34-4	35-5	33-8	36-1
45	12.6	6:44	6:42	6:49	4-4	4-5	4-2.5	14-5	13-8	33-9	35-0	33-2	35-10
40	12.8	6:51	6:48	6:59	4-3	4-4	4-2	14-0	13-5	33-1	34-8	32-9	35-10
35	12.9	6:59	6:55	7:02	4-2	4-4	4-1.5	13-10	13-2	32-9	34-4	32-4	34-5
30	13.0	7:05	7:04	7:08	4-1.5	4-3	4-1	13-7	13-0	32-2	33-8	31-8	34-5
25	13.2	7:15	7:16	7:15	4-1	4-2	4-0	13-4	12-10	31-4	32-8	30-10	34-5
20	13.3	7:29	7:29	7:29	4-0	4-1	3-11	13-2	12-6	30-8	31-9	30-6	33-3
15	13.5	7:44	7:43	7:45	3-11	4-1	3-10	4-0	12-10	29-4	29-5	29-3	32-9
10	13.8	8:17	8:23	8:03	3-10	4-0	3-9	3-11	12-5	28-8	28-6	28-8	32-9
5	14.4	9:06	9:16	8:58	3-7.5	3-9.5	3-7	3-11	11-9	27-0	27-1	26-11	19-3
0	15.8	11:05	11:05	10:32	2-10	3-6	2-10	3-10	9-0	8-0	19-3	23-11	19-3
N	384	387	268	119	394	132	241	21	381	295	392	96	283
Range	5.4	5:49	5:49	5:07	2-11	2-3	2-5	1-7	10-3	11-11	28-8	24-0	22-2
Mean	12.6	6:52	6:51	6:53	4-4.2	4-5.7	4-3.2	4-5.6	14-5	13-11	34-2.1	35-5.6	35-1.2
S.D.	.92	1:02.2	1:05.4	54:4	5.20	4.83	5.20	5.20	1-7.3	1-7.3	4-5.3	4-9.6	4-2.3



TABLE XIV

TRACK AND FIELD PERCENTILE SCORES FOR BOYS AGED 18 AS AT MAY 1st, 1966  
EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	100 Yard Dash	One Mile Run			High Jump			Long Jump			Eight Pound Shot Put		
		On Both	On Cinders	On Grass	All Styles	Straddle Style	Scissors Style	Western Style	No Board	With Board	All Styles	O'Brien Style	Orthodox Style
100	11.0	5:14	5:21	5:14	5-7	5-7	5-5	5-3	18-3	17-4	48-6	45-8	41-11
95	11.4	5:39	5:42	5:26	5-3	5-5	5-2	5-3	17-1	16-4	43-2	45-11	41-11
90	11.6	5:49	5:57	5:43	5-1	5-4	4-10	5-3	16-7	15-8	40-10	43-2	41-11
85	11.7	6:00	6:03	5:49	4-11	4-1.5	4-9	5-2	16-0	15-3	40-0	40-8	38-10
80	11.9	6:09	6:09	5:59	4-9,5	5-1	4-8	5-2	15-10	14-11	39-2	39-6	38-10
75	12.0	6:14	6:15	6:09	4-8	4-11	4-7	5-1	15-8	14-10	38-3	39-2	38-10
70	12.0	6:18	6:18	6:12	4-7	4-10	4-6	5-1	15-6	14-9	37-9	38-1	38-7
65	12.1	6:20	6:21	6:16	4-6	4-10	4-5	5-1	15-3	14-6	37-6	37-10	38-7
60	12.2	6:28	6:28	6:29	4-6	4-9.5	4-4.5	5-1	15-0	14-4	37-0	37-7	38-7
55	12.4	6:31	6:30	6:35	4-5	4-7	4-4	4-11	14-0	14-2	36-8	37-5	35-6
50	12.5	6:39	6:38	6:40	4-4	4-6	4-3.5	4-11	14-7	14-0	35-9	37-4	37-11
45	12.5	6:44	6:44	6:42	4-4	4-6	4-3	4-11	14-4	13-10	35-0	37-2	33-11
40	12.6	6:48	6:48	6:50	4-3	4-5	4-2	4-11	14-1	13-7	34-7	36-8	33-6
35	12.7	6:59	7:00	6:51	4-2	4-4	4-1.5	4-11	14-0	13-5	33-9	35-11	34-7
30	12.8	7:06	7:07	7:00	4-1.5	4-3	4-1	4-6	13-8	13-2	33-3	35-8	32-4
25	12.9	7:23	7:26	7:00	4-1	4-2	4-0	4-6	13-5	12-10	32-5	34-11	31-7
20	13.2	7:35	7:37	7:27	3-11	4-1	3-10	4-5	13-0	12-7	31-7	34-8	33-6
15	13.4	7:57	7:59	7:55	3-10	4-0	3-8	4-5	12-8	12-2	30-11	34-3	33-6
10	13.7	8:30	8:36	8:25	3-7	3-11	3-7	4-3	12-2	11-0	29-11	30-4	30-8
5	14.2	9:26	9:29	8:28	3-5.5	3-8.5	3-5	4-3	11-7	10-11	28-2	29-5	27-10
0	16.0	11:55	11:55	8:54	2-11	3-6	2-11	4-3	9-10	8-5	22-3	28-2	30-8
N	149	156	127	29	160	34	117	9	155	162	157	39	111
Range	5.0	6:41	6:34	3:40	2-8	2-1	2-6	1-0	8-5	8-11	26-3	20-4	23-5
Mean	12.6	6:56	6:59	6:45	4-4.2	4-6.8	4-3.1	4-10.1	14-6	13-10	35-6.7	37-2.2	34-11.1
S.D.	.91	1:08.8	1:11.5	54.8	6.35	6.31	6.05	4.34	1-7.9	1-7.2	4-6.1	4-1.4	4-6.6



TABLE XV

TRACK AND FIELD PERCENTILE SCORES FOR BOYS AGED 19 AS AT MAY 1st, 1966  
EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	100 Yard- Dash Secs.	One Mile Run		High Jump		Long Jump		Eight Pound Shot Put		Not Coded	
		On Both Cinders	On Grass	All Styles	Straddle Style	Scissors Style	Western Style	No Board	With Board	All Styles	O'Brien Style
		Minutes: seconds	Feet-inches	Feet-inches	Feet-inches	Feet-inches	Feet-inches	Feet-inches	Feet-inches	Feet-inches	Feet-inches
100	10.5	5:45	5:45	6:10	5-7	5-7	5-4	44-4	43-7	41-2	41-2
95	10.8	5:46	5:46	6:10	5-4	5-7	5-3	44-4	43-3	41-2	41-2
90	11.2	5:47	5:47	6:10	5-3	5-3	4-9	42-6	43-3	41-2	41-2
85	11.5	5:52	5:50	6:41	4-10	5-3	4-8.5	41-2	43-3	41-2	41-2
80	11.6	6:10	6:08	6:41	4-9	5-3	4-8	40-6	39-5	41-0	41-0
75	11.6	6:13	6:10	6:41	4-8	4-10	4-6	15-8	15-5	39-7	41-0
70	11.8	6:21	6:16	6:42	4-8	4-10	4-6	15-6	15-3	38-8	41-0
65	11.8	6:24	6:21	6:42	4-6	4-10	4-4.5	15-3	15-2	38-6	38-7
60	12.0	6:41	6:26	6:42	4-6	4-10	4-3	14-10	14-10	38-4	38-7
55	12.2	6:43	6:35	6:43	4-5	4-8	4-2	14-8	14-4	38-0	38-7
50	12.3	6:50	6:50	6:43	4-4.5	4-7	4-1.5	14-7	14-2	36-0	38-4
45	12.4	7:00	7:01	6:43	4-4	4-7	4-1.5	14-7	14-1	35-9	38-4
40	12.7	7:08	7:08	7:19	4-2	4-6	4-1	14-6	14-0	35-7	38-4
35	12.7	7:15	7:15	7:19	4-2	4-6	4-1	14-5	13-8	35-6	38-4
30	13.0	7:19	7:15	7:19	4-1	4-5	4-0	14-0	13-8	34-7	35-7
25	13.0	7:42	7:42	8:34	4-1	4-4.5	3-1.1	13-7	13-2	34-0	35-6
20	13.2	7:45	7:45	8:34	4-0	4-4.5	3-1.1	13-6	13-0	33-1	35-7
15	13.6	8:12	7:46	8:34	3-11	4-4	3-10.5	13-1	12-8	31-9	31-8
10	14.0	8:34	8:12	9:58	3-10.5	4-4	3-9	12-0	12-6	30-8	31-8
5	14.5	9:58	8:48	9:58	3-6	4-0	3-6	11-7	10-8	27-2	31-8
0	14.5	10:57	10:57	9:58	3-5	4-0	3-5	11-6	10-0	23-6	31-8
N	28	38	31	7	38	12	26	0	38	40	10
Range	4.0	5:12	5:12	3:48	2-2	1-7	1-11	6-4	7-2	20-10	12-7
Mean	12.4	7:04	6:59	7:27	4-4.8	4-8.6	4-3.0	14-9	14-4	36-4.7	37-10.9
S.D.	1.01	1:09.6	1:07.2	1:21.0	6.05	5.47	5.54	1-8.5	1-7.2	4-10.4	5-3.8



## SCORING TABLES BASED ON THE COZENS-TRIEB-NEILSON CLASSIFICATION FORMULA

The Cozens-Trieb-Neilson classification formula (or California Classification Index) is  $2(\text{age}) + .475(\text{Height}) + .16(\text{Weight})$ . Age, Height and Weight are taken to the nearest month, half-inch, and pound, respectively. Age is converted to months, instead of years and extra months.

The Exponent Chart. From the chart below a separate exponent is obtained for each of age, height, and weight. The three numbers are then added to give the sum of the exponents.

EXONENT	AGE	HEIGHT	WEIGHT	EXONENT
9			53- 59	9
10			60- 65	10
11			66- 71	11
12			72- 78	12
13			79- 84	13
14			85- 90	14
15			91- 96	15
16			97-103	16
17			104-109	17
18			110-115	18
19			116-121	19
20			122-128	20
21			129-134	21
22	129-134	0.0-47	135-140	22
23	135-140	47.5-49	141-146	23
24	141-146	49.5-51.5	147-153	24
25	147-152	52 -53.5	154-159	25
26	153-158	54 -55.5	160-165	26
27	159-164	56 -57.5	166-171	27
28	165-170	58 -59.5	172-178	28
29	171-176	60 -62	179-184	29
30	177-182	62.5-64	185-190	30
31	183-188	64.5-66	191+	31
32	189-194	66.5-68		32
33	195-200	68.5-70.5		33
34	201-206	71 -72.5		34
35	207-212	73 -74.5		35
36	213-218	75+		36
37	219-224			37
38	225-230			38

CLASSIFICATION  
GROUPINGS  
Sum of Ex-  
ponents Class Number  
A' 1A  
A 1  
B 2  
C 3  
D 4  
E 5  
  
NOTE: For ages  
above and below the  
chart, and for  
weights below the  
chart, exponent  
values should be  
extrapolated.



An example of a boy classified on May 1st, 1966 using the Cozens-Trieb-Neilson chart.

The boy was 16 years old on September 9th, 1965	
His age is 16 years and 8 months as at May 1st, 1966	
His age in months is 200 having an exponent of . . . . .	33
His height is 67.5 inches having an exponent of . . . . .	32
His weight is 164 pounds having an exponent of . . . . .	<u>27</u>
Sum of exponents	92

He would, therefore, be in Class A', which is Group Number 1A.

The following scoring tables represent the present level of performance of boys taking physical education classes in Edmonton high schools based on six different groups according to the Cozens-Trieb-Neilson formula.



TABLE XVI

 100 YARD DASH PERCENTILE SCORES FOR BOYS BASED ON CLASSIFICATION INDEX  
 EDMONTON SENIOR HIGH SCHOOLS

Percen- tile	Cozens-Trieb-Neilson Classification as at May 1st, 1966					
	70-74 5	75-78 4	79-82 3	83-87 2	88-91 1	92+ 1A
100	12.0	11.6	11.5	10.7	10.4	10.5
95	12.0	12.5	12.1	11.6	11.4	11.4
90	12.8	12.9	12.3	11.9	11.7	11.7
85	12.8	13.0	12.4	12.1	11.8	11.9
80	13.2	13.0	12.6	12.3	12.0	12.0
75	13.5	13.1	12.7	12.4	12.1	12.1
70	13.5	13.1	12.9	12.5	12.2	12.2
65	13.5	13.2	13.0	12.6	12.3	12.3
60	13.7	13.4	13.1	12.7	12.5	12.5
55	13.7	13.5	13.2	12.9	12.5	12.6
50	14.2	13.7	13.4	13.0	12.6	12.7
45	14.5	13.9	13.5	13.0	12.7	12.8
40	14.5	14.0	13.6	13.1	12.9	13.0
35	14.6	14.0	13.7	13.3	13.0	13.0
30	14.6	14.2	13.8	13.4	13.1	13.2
25	14.6	14.5	14.0	13.5	13.2	13.4
20	15.0	14.6	14.2	13.7	13.4	13.6
15	15.3	14.9	14.5	13.9	13.6	13.9
10	15.3	15.1	14.6	14.1	13.9	14.4
5	15.8	15.6	15.0	14.6	14.5	15.0
0	15.8	17.3	17.4	17.9	19.5	18.0
N	13	81	305	933	807	586
Range	3.8	5.7	5.9	7.2	9.1	7.5
Mean	14.1	13.8	13.4	13.0	12.8	12.9
S.D.	1.06	1.02	0.97	0.92	1.00	1.13



TABLE XVII

ONE MILE RUN PERCENTILE SCORES FOR BOYS BASED ON CLASSIFICATION INDEX  
EDMONTON SENIOR HIGH SCHOOLS

Percen- tile	Cozens-Trieb-Neilson Classification as at May 1st, 1966					
	70-74 5	75-78 4	79-82 3	83-87 2	88-91 1	92+ 1A
100	6:15	5:29	5:15	4:59	5:14	5:16
95	6:15	5:49	5:53	5:47	5:43	5:43
90	6:25	6:13	6:01	5:59	5:53	5:57
85	6:25	6:19	6:11	6:06	6:02	6:04
80	6:29	6:26	6:19	6:11	6:10	6:12
75	6:43	6:32	6:24	6:18	6:15	6:18
70	6:43	6:36	6:29	6:23	6:20	6:25
65	6:44	6:40	6:32	6:29	6:24	6:30
60	6:44	6:42	6:36	6:33	6:29	6:39
55	6:46	6:44	6:39	6:38	6:35	6:43
50	6:49	6:48	6:43	6:43	6:41	6:50
45	6:49	6:51	6:47	6:50	6:48	6:56
40	6:54	6:55	6:52	6:56	6:56	7:04
35	6:54	7:07	7:01	7:01	7:02	7:14
30	7:00	7:13	7:10	7:07	7:10	7:21
25	7:11	7:15	7:20	7:13	7:19	7:32
20	7:11	7:22	7:28	7:20	7:29	7:45
15	7:17	7:38	7:36	7:31	7:39	8:07
10	7:17	7:56	7:50	7:51	7:59	8:34
5	7:36	8:13	8:25	8:29	8:47	9:34
0	7:36	8:25	13:06	11:12	11:25	13:40
N	12	78	295	909	801	578
Range	1:21	2:56	7:51	6:13	6:11	8:24
Mean	6:51	6:55	6:55	6:51	6:52	7:06
S.D.	22.9	28.3	53.2	48.3	55.3	1:10.5



TABLE XVIII

 RUNNING HIGH JUMP PERCENTILE SCORES FOR BOYS BASED ON  
 CLASSIFICATION INDEX  
 EDMONTON SENIOR HIGH SCHOOLS

Percen- tile	Cozens-Trieb-Neilson Classification as at May 1st, 1966					
	70-74 5	75-78 4	79-82 3	83-87 2	88-91 1	92+ 1A
100	4-3	4-9	5-3	5-5	5-7	5-9
95	4-3	4-8	4-8	4-10	5-1	5-2
90	4-1.5	4-4	4-6	4-8	4-11	4-11
85	4-1.5	4-3	4-5.5	4-7	4-9	4-10
80	3-11	4-2.5	4-5	4-6	4-8	4-9
75	3-10	4-2	4-4	4-5.5	4-7	4-8
70	3-10	4-1.5	4-3	4-5	4-6	4-7
65	3-10	4-0	4-2	4-4	4-6	4-6
60	3-8	4-0	4-1.5	4-3	4-5	4-5.5
55	3-8	3-11	4-1	4-3	4-4.5	4-5
50	3-7	3-10	4-1	4-2	4-4	4-4
45	3-6	3-8	4-0	4-2	4-3	4-3.5
40	3-6	3-9	3-11	4-1	4-3	4-3
35	3-6	3-8	3-11	4-0.5	4-2	4-2
30	3-6	3-8	3-10	4-0	4-1	4-1
25	3-6	3-7.5	3-9	3-11	4-1	4-0
20	3-5.5	3-7	3-9	3-10	4-0	3-10
15	3-5	3-6	3-8	3-9	3-11	3-9
10	3-5	3-5	3-6	3-8	3-9	3-7
5	3-5	3-3.5	3-4	3-6.5	3-9	3-5
0	3-5	2-6	2-8	2-10	2-10	2-6
N	13	81	302	916	814	591
Range	0-10	2-3	2-7	2-7	2-9	3-3
Mean	3-8.3	3-10.3	4-0.4	4-2.2	4-3.9	4-3.6
S.D.	3.32	5.11	4.88	4.83	5.18	6.28



TABLE XIX

 RUNNING LONG JUMP PERCENTILE SCORES FOR BOYS BASED ON  
 CLASSIFICATION INDEX  
 EDMONTON SENIOR HIGH SCHOOLS

Percen- tile	Cozens-Trieb-Neilson Classification as at May 1st, 1966					
	70-74 5	75-78 4	79-82 3	83-87 2	88-91 1	92+ 1A
100	14-6	14-11	17-1	17-10	17-9	19-11
95	14-6	14-0	15-0	15-10	16-2	16-5
90	13-10	13-8	14-7	15-3	15-8	15-11
85	13-10	13-5	14-2	14-11	15-3	15-5
80	13-2	13-4	13-11	14-7	15-0	15-1
75	12-7	13-0	13-10	14-3	14-9	14-10
70	12-7	12-11	13-7	14-1	14-6	14-8
65	12-3	12-9	13-5	13-11	14-4	14-6
60	12-2	12-7	13-2	13-9	14-2	14-3
55	12-2	12-6	13-0	13-7	14-0	14-0
50	11-10	12-3	12-10	13-4	13-9	13-8
45	11-4	12-0	12-8	13-2	13-7	13-6
40	11-4	11-11	12-6	12-11	13-5	13-3
35	11-4	11-7	12-5	12-9	13-3	13-0
30	10-5	11-4	12-2	12-6	13-0	12-10
25	10-5	11-2	11-11	12-4	12-8	12-6
20	10-5	11-0	11-9	12-1	12-6	12-2
15	10-0	10-9	11-5	11-11	12-3	11-10
10	10-0	10-4	11-1	11-5	11-10	11-3
5	9-8	9-7	10-5	10-10	11-1	10-4
0	9-8	9-2	7-6	8-2	7-10	6-10
N	13	81	310	928	816	600
Range	4-10	5-9	9-7	9-8	9-11	13-1
Mean	11-9.7	12-1.1	12-9.8	13-4.0	13-8.7	13-7.4
S.D.	1-5.8	1-3.9	1-4.9	1-6.0	1-6.2	1-10.3



TABLE XX

EIGHT POUND SHOT PUT PERCENTILE SCORES FOR BOYS BASED ON  
 CLASSIFICATION INDEX  
 EDMONTON SENIOR HIGH SCHOOLS

Percen- tile	Cozens-Trieb-Neilson Classification as at May 1st, 1966					
	70-74 5	75-78 4	79-82 3	83-87 2	88-91 1	92+ 1A
100	28-2	32-0	37-0	42-3	46-8	49-4
95	28-2	30-4	32-11	36-9	39-6	42-10
90	25-8	28-3	31-1	35-4	38-2	41-0
85	25-8	27-10	30-4	34-4	37-3	40-0
80	24-9	27-3	29-10	33-8	36-6	39-2
75	24-5	26-4	29-2	33-0	35-11	38-5
70	24-5	25-7	28-10	32-4	35-4	37-11
65	24-3	25-2	28-5	31-9	34-9	37-3
60	22-9	25-0	28-0	31-4	34-3	36-9
55	22-9	24-10	27-4	30-10	33-8	36-1
50	21-9	34-7	37-0	30-6	33-2	35-6
45	21-3	24-6	26-6	30-1	32-9	35-1
40	21-3	24-3	26-3	29-8	32-4	34-7
35	19-11	23-2	25-9	29-0	31-11	34-0
30	19-11	23-0	25-2	28-8	31-4	33-4
25	19-11	22-4	24-7	28-1	30-9	32-6
20	17-6	21-8	24-1	27-6	30-1	31-7
15	17-6	21-6	23-8	26-10	29-3	30-8
10	17-6	20-0	22-10	26-0	28-5	29-3
5	17-4	18-10	22-0	24-6	27-0	27-3
0	17-4	17-0	19-1	18-0	22-11	21-11
N	13	77	296	914	803	593
Range	10-10	15-0	17-11	24-3	23-9	27-5
Mean	21-11.2	24-5.4	27-0.9	30-6.6	33-3.8	35-5.3
S.D.	3-5.3	3-1.7	3-3.0	3-8.5	3-10.4	4-7.6



TABLE XXI

TRACK AND FIELD PERCENTILE SCORES FOR BOYS IN CLASS 5 AS AT MAY 1st, 1966  
 (COZENS-TRIEB-NEILSON NUMBERS 70-74 INCLUSIVE)  
 EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	100 Yard Dash Secs.	One Mile Run			High Jump			Long Jump			Eight Pound Shot Put			
		On Both Cinders	On Grass	Minutes:seconds	All Styles	Straddle Style	Scissors Style	Western Style	No Board	With Board	All Styles	O'Brien Style	Orthodox Style	Not Coded
100	12.0	6:15	6:15	6:25	4-3	3-6	4-3	4-3	13-10	14-6	28-2	28-2	28-2	
95	12.0	6:15	6:15	6:25	4-3	3-6	4-3	4-3	13-10	14-6	28-2	28-2	28-2	
90	12.8	6:25	6:15	6:25	4-1.5	3-6	4-1.5	4-1.5	13.6	13-10	25-8	25-8	25-8	
85	12.8	6:25	6:15	6:29	4-1.5	3-6	4-1.5	4-1.5	13-6	13-10	25-8	25-8	25-8	
80	13.2	6:29	6:43	6:29	3-11	3-6	3-11	3-11	13-4	13-2	24-9	24-9	24-9	
75	13.5	6:43	6:43	6:29	3-10	3-6	3-11	3-11	12-8	12-7	24-5	24-5	24-5	
70	13.5	6:43	6:43	6:46	3-10	3-6	3-10	3-10	12-8	12-7	24-5	24-5	24-5	
65	13.5	6:44	6:43	6:46	3-10	3-5.5	3-10	3-5.5	12-6	12-3	24-3	24-3	24-3	
60	13.7	6:44	6:44	6:46	3-8	3-5.5	3-10	3-5.5	12-4	12-2	22-9	22-9	22-9	
55	13.7	6:46	6:44	6:49	3-8	3-5.5	3-10	3-5.5	12-4	12-2	22-9	22-9	22-9	
50	14.2	6:49	6:44	6:49	3-7	3-5.5	3-8	3-5.5	12-3	11-10	21-9	21-9	21-9	
45	14.5	6:49	6:44	6:49	3-6	3-5.5	3-8	3-5.5	12-0	11-4	21-3	21-3	21-3	
40	14.5	6:54	7:00	6:54	3-6	3-5.5	3-7	3-5.5	12-0	11-4	21-3	21-3	21-3	
35	14.6	6:54	7:00	6:54	3-6	3-5.5	3-7	3-5.5	11-7	11-4	19-11	19-11	19-11	
30	14.6	7:00	7:00	6:54	3-6	3-5	3-6	3-5	11-7	10-5	19-11	19-11	19-11	
25	14.6	7:11	7:00	7:17	3-6	3-5	3-6	3-5	11-7	10-5	19-11	19-11	19-11	
20	15.0	7:11	7:11	7:17	3-5.5	3-5	3-6	3-5	11-5	10-5	17-6	17-6	17-6	
15	15.3	7:17	7:11	7:17	3-5	3-5	3-6	3-5	10-11	10-0	17-6	17-6	17-6	
10	15.3	7:17	7:11	7:36	3-5	3-5	3-5	3-5	10-11	10-0	17-6	17-6	17-6	
5	15.8	7:36	7:11	7:36	3-5	3-5	3-5	3-5	10-8	9-8	17-4	17-4	17-4	
0	15.8	7:36	7:11	7:36	3-5	3-5	3-5	3-5	10-8	9-8	17-4	17-4	17-4	
N	13	12	5	7	13	3	10	0	13	13	1	12	0	
Range	3.8	1:21	0:56	1:11	0-10.0	0-1.0	0-10.0	0	3-2	4-10	10-10	-	10-10	
Mean	14.1	6:51	6:47	6:50	3-8.3	3-5.5	3-9.2	-	12-2.4	11-9.7	21-11.2	17-6.0	22-3.7	
S.D.	1.06	22.9	21.2	25.3	3.32	0.25	3.35	-	11.7	1-5.8	3-5.3	-	3-3.8	



TABLE XXII

TRACK AND FIELD PERCENTILE SCORES FOR BOYS IN CLASS 4 AS AT MAY 1st, 1966  
 (COZENS-TRIEB-NEILSON NUMBERS 70-74 INCLUSIVE)  
 EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	100 Yard Dash	One Mile Run		High Jump			Long Jump			Eight Pound Shot Put		
		On Both	On Cinders	All Styles	Straddle, Scissors, Western Style	Style	No Board	With Board	All Styles	O'Brien Style	Orthodox Style	Coded
		Minutes:seconds	Feet-inches				Feet-inches		Feet-inches			
100	11.6	5:29	5:47	5:29	4-9	4-8	4-2	15-5	14-11	32-0	32-0	28-3
95	12.5	5:49	5:56	5:43	4-8	4-8	4-7	15-0	14-0	30-4	29-2	28-3
90	12.9	6:13	6:19	6:13	4-4	4-8	4-4	14-2	13-8	28-3	29-2	28-3
85	13.0	6:19	6:20	6:18	4-3	4-3	4-3	14-1	13-5	27-10	25-0	26-1
80	13.0	6:26	6:25	6:32	4-2.5	4-2	4-2	13-10	13-4	27-3	25-0	26-1
75	13.1	6:32	6:28	6:32	4-2	4-2	4-2	13-7	13-0	26-4	25-0	25-10
70	13.1	6:36	6:38	6:33	4-1.5	4-1	4-1.5	13-4	12-11	25-7	22-10	25-10
65	13.2	6:40	6:41	6:38	4-0	4-0	4-0	13-2	12-9	25-2	22-10	25-3
60	13.4	6:42	6:42	6:41	4-0	4-0	3-1 1.5	13-0	12-7	25-0	22-10	24-7
55	13.5	6:44	6:42	6:45	3-11	3-11	3-11	12-10	12-6	24-10	22-4	24-7
50	13.7	6:48	6:46	6:50	3-10	3-9	3-10	12-6	12-3	24-7	22-4	24-6
45	13.9	6:51	6:53	6:50	3-9	3-8	3-9.5	12-5	12-0	24-6	22-4	24-6
40	14.0	6:55	6:56	6:51	3-0	3-0	3-0	12-3	11-11	24-3	21-8	24-4
35	14.0	7:07	7:03	7:10	3-8	3-8	3-0	12-1	11-7	23-2	21-8	23-2
30	14.2	7:13	7:09	7:25	3-8	3-8	3-8	12-0	11-4	23-0	21-8	21-1
25	14.5	7:15	7:13	7:38	3-7.5	3-6	3-7.5	11-8	11-2	22-4	19-4	23-0
20	14.6	7:22	7:15	7:48	3-7	3-6	3-7	11-5	11-0	21-9	19-4	22-2
15	14.9	7:38	7:17	8:00	3-6	3-4	3-6	11-2	10-9	21-6	19-4	19-7
10	15.1	7:56	7:22	8:09	3-5	3-4	3-5	10-6	10-4	20-0	18-10	21-6
5	15.6	8:13	7:40	8:18	3-3.5	2-9	3-3.5	10-3	9-7	18-10	18-10	18-6
0	17.3	8:25	8:21	8:25	2-6	2-0	2-6	4-2	9-7	9-2	17-0	17-0
N	81	78	42	36	81	19	61	1	81	77	7	61
Range	5.7	2:56	2:34	2:56	2-3	1-11	2-3	-	5-10	5-0	15-0	9-9
Mean	13.8	6:55	6:50	7:00	3-10.3	3-10	3-10.4	-	12-7.0	12-1.1	24-5.4	24-9.4
S.D.	1.02	38.3	31.9	44.6	5.11	5.63	5.01	-	1-4.7	1-3.9	3-1.7	23-6.1
											3-6.3	3-0.6



TABLE XXXIII

TRACK AND FIELD PERCENTILE SCORES FOR BOYS IN CLASS 3, AS AT MAY 1st, 1966  
 (COZENS-TRIEB-NEILSON NUMBERS 75-82 INCLUSIVE)  
 EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	100 Yard Dash	One Mile Run		High Jump		Long Jump		Eight Pound Shot Put			
		On Both Cinders	On Grass	All Styles	Straddle Style	Scissors Style	Western Style	No Board	O'Brien Style	Orthodox Style	Not Coded
		Minutes: seconds		Feet-inches		Feet-inches		Feet-inches		Feet-inches	
100	11.5	5:15	5:27	5:3	5-3	4-11	4-8	17-8	17-1	37-0	32-2
95	12.1	5:53	5:53	4:8	4-10	4-8	4-8	15-5	15-0	32-11	32-2
90	12.3	6:01	6:02	6:00	4-6	4-6	4-6	14-10	14-7	31-7	30-5
85	12.4	6:11	6:14	6:07	4-5.5	4-6	4-5	14-6	14-2	30-4	30-5
80	12.6	6:19	6:19	6:15	4-5	4-5	4-1	14-3	13-11	29-10	30-2
75	12.7	6:24	6:26	6:23	4-4	4-4	4-4	14-1	13-10	29-6	29-9
70	12.9	6:29	6:31	6:25	4-3	4-3	4-3	13-10	13-7	28-10	29-9
65	13.0	6:32	6:32	6:31	4-2	4-3	4-2	13-9	13-5	28-5	28-9
60	13.1	6:36	6:36	6:35	4-1.5	4-2	4-1	13-7	13-2	28-0	28-9
55	13.2	6:39	6:40	6:39	4-1	4-1	4-0	13-11	13-4	27-4	27-9
50	13.4	6:43	6:44	6:41	4-1	4-1	4-0	13-11	13-2	27-0	27-9
45	13.5	6:47	6:47	6:45	4-0	4-0	4-0	13-11	13-0	27-10	26-4
40	13.6	6:52	6:51	6:56	3-11	4-0	3-11	13-10	12-6	26-3	26-4
35	13.6	7:01	6:59	7:06	3-11	3-11	3-11	13-10	12-5	25-9	25-7
30	13.8	7:10	7:07	7:14	3-10	3-10.5	3-10	12-7	12-2	25-2	24-10
25	14.0	7:20	7:17	7:20	3-9	3-9.5	3-9	12-3	11-11	24-7	24-6
20	14.2	7:28	7:30	7:25	3-0	3-9	3-8	12-0	11-9	24-1	23-10
15	14.5	7:36	7:40	7:35	3-8	3-8	3-7	11-9	11-5	23-8	23-6
10	14.6	7:50	7:57	7:43	3-6	3-4.5	3-7	11-5	11-1	22-10	23-6
5	15.0	8:25	8:54	7:56	3-4	3-2	3-5	11-0	10-5	22-0	23-1
0	17.4	13:06	13:06	10:02	2-8	2-8	3-0	7-3	7-6	19-1	21-1
N	305	295	174	121	302	94	196	12	306	296	44
Range	5.9	7:51	7:51	4:35	2-7	1-11	1-3	10-5	9-7	17-11	12-6
Mean	13.4	6:55	6:57	6:51	4-0.4	4-0.7	4-0.4	3-11.5	13-2.3	12-9.8	27-0.9
S.D.	.97	53.2	58.1	45.1	4.88	5.54	4.47	4.58	1-4.6	2-11.1	3-3.0



TABLE XXIV

TRACK AND FIELD PERCENTILE SCORES FOR BOYS IN CLASS 2 AS AT MAY 1st, 1966  
 (COZENS-TRIEB-NEILSON NUMBERS 83-87 INCLUSIVE)  
 EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	100 Yard Dash Secs.	One Mile Run		All On Both Cinders Grass		High Jump		Eight Pound Shot Put		All O'Brien Orthodox Styles		Not Coded	
		On Minutes; Seconds	On Seconds	Styles	Style	Straddle Style	Scissors Style	Western Style	No Board	With Board	Foot-inches	Foot-inches	Foot-inches
100	10.7	4:59	4:59	5:20	5:5	5-5	5-3	5-4	18-0	17-10	42-3	40-5	42-3
95	11.6	5:47	5:48	5:45	4:10	4-11	4-10	4-10	16-2	15-10	36-9	36-8	37-9
90	11.9	5:50	6:01	5:57	4:8	4-9	4-8	4-9	15-8	15-3	35-4	35-8	36-11
85	12.1	6:06	6:08	6:03	4:7	4-8	4-7	4-8	15-3	14-11	34-4	34-5	34-0
80	12.3	6:11	6:14	6:09	4:6	4-7	4-5.5	4-6.5	15-0	14-7	33-8	34-0	33-7
75	12.4	6:18	6:20	6:15	4:5.5	4-6	4-5	4-6	14-10	14-3	33-0	33-6	32-10
70	12.5	6:23	6:25	6:21	4:5	4-6	4-5	4-4	14-7	14-1	32-4	32-9	32-3
65	12.6	6:29	6:30	6:27	4:4	4-5	4-5	4-3	14-5	13-11	31-9	32-3	31-7
60	12.7	6:33	6:35	6:31	4:3	4-4.5	4-4.5	4-3	14-3	13-9	31-4	31-10	30-0
55	12.9	6:38	6:40	6:34	4:3	4-4	4-4	4-2	14-1	13-7	30-10	31-6	28-11
50	13.0	6:43	6:45	6:38	4:2	4-3	4-2	4-2	14-1	13-11	30-6	30-11	30-2
45	13.0	6:50	6:50	6:45	4:2	4-2.5	4-2.5	4-1	14-4	13-4	31-4	31-10	30-0
40	13.1	6:56	6:56	6:54	4:1	4-2	4-1	4-1	14-7	13-2	30-1	30-7	28-5
35	13.3	7:01	7:01	6:59	4:0.5	4-1.5	4-1.5	4-0	14-3	13-4	30-6	30-11	28-8
30	13.4	7:07	7:07	7:07	4:0	4-1	4-1	4-0	14-1	13-2	29-0	29-4	27-9
25	13.5	7:13	7:13	7:13	3-11	3-11	3-11	4-0	14-0	12-11	28-1	28-4	26-11
20	13.7	7:20	7:20	7:20	3-10	3-10	3-10	4-0	12-8	12-1	27-8	27-7	26-5
15	13.9	7:31	7:35	7:29	3-9	3-9.5	3-11.5	3-11.5	12-5	11-11	26-10	27-0	25-1
10	14.1	7:50	7:58	7:44	3-8	3-8	3-8	3-8	12-0	11-5	26-0	26-4	23-11
5	14.6	8:29	8:35	8:14	3-6.5	3-7	3-6.5	3-7	11-4	10-10	24-6	25-8	23-3
0	17.9	11:12	11:12	10:23	2-10	2-10	2-10	3-1	8-11	8-2	23-11	18-0	19-3
N	933	909	570	339	916	286	588	42	915	928	914	187	700
Range	7.2	6:13	6:13	5:03	2-7	2-7	2-5	2-3	9-1	908	24-3	16-6	24-3
Mean	13.0	6:51	6:53	6:47	4-2.2	4-2.9	4-1.8	4-3.3	13-10.2	13-4.0	30-26.6	30-11.6	20-1
S.D.	.92	48.3	49.4	46.2	4.83	5.05	4.67	4.84	1-5.2	1-6.0	3-8.5	3-5.9	29-6.2



TABLE XXV

TRACK AND FIELD PERCENTILE SCORES FOR BOYS IN CLASS 1 AS AT MAY 1st, 1966  
 (COZENS-TRIEB-NEILSON NUMBERS 88-91 INCLUSIVE)  
 EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	100 Yard Dash	One Mile Run		High Jump		Long Jump		Eight Pound Shot Put		Not Coded
		On Both	On Cinders	All Styles	Straddle Style	Scissors Style	Western Style	No Board	With Board	
		Minutes:seconds		Feet-inches		Feet-inches		Feet-inches		Feet-inches
100	10.4	5:14	5:20	5:14	5-7	5-6	5-5	19-3	17-9	46-8
95	11.4	5:43	5:44	5:40	5-1	4-11	5-3	16-9	16-2	40-7
90	11.7	5:53	5:56	5:50	4-11	4-9.5	5-2	16-4	15-8	39-4
85	11.8	6:02	6:05	5:59	4-9	4-10.5	4-8	15-11	15-3	37-6
80	12.0	6:10	6:11	6:05	4-8	4-0	4-8	15-8	15-0	36-8
75	12.1	6:15	6:16	6:13	4-7	4-8	4-9	15-4	14-9	35-11
70	12.2	6:20	6:19	6:19	4-6	4-8	4-8	15-2	14-6	35-4
65	12.3	6:24	6:23	6:24	4-6	4-7	4-5	14-11	14-4	34-9
60	12.5	6:29	6:29	6:29	4-5	4-6	4-4	14-8	14-2	34-3
55	12.5	6:35	6:34	6:35	4-4.5	4-5.5	4-4	14-5	14-2	35-8
50	12.6	6:41	6:41	6:42	4-4	4-5	4-3	14-6	14-0	35-0
45	12.7	6:48	6:47	6:52	4-3	4-4	4-4	14-4	13-9	33-8
40	12.9	6:56	6:52	7:00	4-3	4-3.5	4-2	14-3	13-11	33-2
35	13.0	7:02	7:00	7:08	4-2	4-3	4-2	13-9	13-3	32-10
30	13.1	7:10	7:07	7:14	4-1	4-2	4-1	13-6	13-0	34-9
25	13.2	7:19	7:17	7:19	4-1	4-1	4-0	13-3	12-8	32-8
20	13.4	7:29	7:27	7:30	4-0	4-0	4-0	13-0	12-7	31-1
15	13.6	7:39	7:37	7:42	3-11	3-11	4-0	12-8	12-3	31-1
10	13.9	7:59	7:54	8:01	3-0	3-0	4-0	12-4	11-10	32-2
5	14.5	8:47	9:02	8:36	3-7	3-7.5	3-6	11-9	11-1	31-5
0	19.5	11:25	11:25	10:32	2-10	3-1	2-10	9-6	7-10	30-6
N	807	801	472	329	814	283	479	52	806	803
Range	9.1	6:11	6:05	5:18	2-8	2-5	2-2	9-9	9-11	23-9
Mean	12.8	6:52	6:53	6:51	4-3.9	4-4.7	4-3.3	14-3.6	13-8.7	33-3.8
S.D.	1.0	55.3	56.7	53.1	5.18	5.41	5.70	1-6.6	1-6.2	32-10.5
										33-11.0
										3-11.5
										3-9.2



TABLE XXVI

TRACK AND FIELD PERCENTILE SCORES FOR BOYS IN CLASS 1A AS AT MAY 1st, 1966  
 (COZENS-TRIEB-NEILLSON NUMBERS 92 AND ABOVE)  
 EDMONTON SENIOR HIGH SCHOOLS

Per- cen- tile	100 Yard Dash	One Mile Run		All On Both Cinders Grass		High Jump		Long Jump		Eight Pound Shot Put		
		On Yard	On Dash	Styles	Style	Scissors Style	Western Style	No Board	With Board	All Styles	O'Brien Style	Orthodox Style
		Minutes: seconds		Feet-inches		Feet-inches		Feet-inches		Feet-inches		
100	10.5	5:16	5:16	5:26	5:9	5-9	5-8	5-5	18-7	19-11	49-4	48-10
95	11.4	5:43	5:44	5:43	5:2	5-3	5-0	5-3	17-1	16-5	42-10	42-0
90	11.7	5:57	5:55	6:01	4-11	5-0	4-10	5-2.5	16-5	15-11	43-2	43-2
85	11.9	6:04	6:03	6:10	4-10	4-9	4-9	5-1	15-11	41-0	40-0	41-2
80	12.0	6:12	6:10	6:15	4-9	4-10	4-8	4-11	15-8	15-1	39-2	39-6
75	12.1	6:18	6:17	6:23	4-8	4-9	4-7	4-11	15-5	14-10	38-5	41-0
70	12.2	6:25	6:24	6:27	4-7	4-8	4-6	4-10	15-3	14-8	37-11	38-7
65	12.3	6:30	6:29	6:35	4-6	4-6.5	4-5	4-9	15-0	14-6	37-3	37-10
60	12.5	6:39	6:37	6:40	4-5.5	4-6	4-4.5	4-8	14-9	14-3	36-9	37-4
55	12.6	6:43	6:43	6:44	4-5	4-6	4-4	4-4	14-7	14-0	36-1	37-0
50	12.7	6:50	6:48	6:52	4-4	4-5	4-5	4-3	14-5	13-8	35-6	36-5
45	12.8	6:56	6:55	6:58	4-3.5	4-4.5	4-2.5	4-6	14-2	13-6	35-1	36-0
40	13.0	7:04	7:05	7:05	4-3	4-2	4-4	4-2	13-11	13-3	34-7	35-6
35	13.0	7:14	7:14	7:14	4-2	4-4	4-1	4-4.5	13-8	13-0	34-0	35-1
30	13.2	7:21	7:20	7:23	4-1	4-3	4-0	4-3	13-5	12-10	33-4	34-5
25	13.4	7:32	7:31	7:32	4-0	4-1	3-10.5	4-3	13-1	12-6	32-6	34-3
20	13.6	7:45	7:45	7:52	3-10	4-1	3-9	4-0.5	12-9	12-2	31-7	32-2
15	13.9	8:07	8:10	8:03	3-9	3-11	3-7	3-10	12-2	11-10	30-8	31-8
10	14.4	8:34	8:40	8:25	3-7	3-9	3-6	3-7	11-7	11-3	29-3	29-11
5	15.0	9:34	9:37	8:57	3-5	3-7	3-4	3-1	10-9	10-4	27-3	28-1
0	18.0	13:40	13:40	10:15	2-6	3-4	2-6	3-1	7-6	6-10	21-11	25-5
N	586	578	384	194	591	183	368	40	584	600	593	409
Range	7.5	8:24	8:24	4:49	3-3	2-5	2-2	2-4	11-1	13-1	27-5	24-6
Mean	12.9	7:06	7:07	7:03	4-3.5	4-5.1	4-2.6	4-4.1	14-2.2	13-7.4	35-5.3	36-9.1
S.D.	1.13	1:10.5	1:16.0	58.2	6.28	5.61	6.32	6.88	1-10.2	1-10.3	4-7.6	4-7.1



## V. CHARACTERISTICS OF THE DISTRIBUTIONS

Histograms and measures of skewness were obtained for each test item from the IBM 7040 computer. Inspection of the results revealed a negative skewness in the distributions with the exception of the shot put event. Table XXVII gives a summary of the skewness.

TABLE XXVII

SKEWNESS OF THE DISTRIBUTION OF PERFORMANCE SCORES IN TRACK AND  
FIELD EVENTS MAY, 1966  
EDMONTON SENIOR HIGH SCHOOLS

Age	100 Yard Dash	A. ACCORDING TO AGE				Eight-Pound Shot Put
		One Mile Run	Running High Jump	Running Long Jump		
14 Years	-.77	-.1.24	-.36	+.11	+.44	
15	-1.01	-1.43	-.13	-.16	+.17	
16	-1.10	-1.82	-.18	-.35	+.14	
17	-.61	-1.41	-.17	-.11	-.12	
18	-1.26	-1.65	-.16	-.44	-.04	
19	-.37	-1.45	+.43	-.58	-.65	

B. ACCORDING TO COZENS-TRIEB-NEILSON  
CLASSIFICATION FORMULA

Class No.					
5	+.26	-.42	+.90	+.30	+.13
4	-.70	-.42	-.35	-.35	-.04
3	-.77	-2.14	-.16	-.25	+.22
2	-.82	-1.22	-.15	-.11	+.06
1	-1.30	-1.26	-.10	-.29	+.12
1A	-1.25	-1.66	-.31	-.40	-.11

\* All values are measures of g.

These results agree with those of Routledge (25) who found distributions negatively skewed for the fifty-yard dash and six hundred yard run-walk events in the AAHPER Youth Fitness test. Ehrlich (10) found



the distribution for the one-hundred yard dash to be positively skewed. From his study he indicated that negative skewness in physical performance distributions is a very rare occurrence.

Garrett (15) says that performances by the same person on various test items can be compared using standard scores if the distributions of the raw scores are of the same form. Table XXVII indicates that the distributions vary considerably in form so that standard scores would not give an accurate comparison between performances of an individual on the five test items. Standard scores also force normality upon the distributions and this is not desirable where there is a characteristic skewness.

It is felt that the results of this study do represent the characteristics of the population in view of the fact that an effort was made to test the whole population and not just a sample.

Percentile scores were chosen because they do not distort the distribution of the scores. They also facilitate the comparison of an individual's performance on several test items. A percentile rank of 75 has the same meaning in any number of situations regardless of the nature of the distribution.

Figures 1 and 2 illustrate the following information for the test items for each of the six age groups and the six classes based on age, height, and weight:

- (a) P75 - the 75th percentile )
- )
- (b) P50 - the median             ) interquartile range
- )
- (c) P25 - the 25th percentile )
- (d)  $\bar{X}$  - group mean
- (e)  $\mu$  - population mean



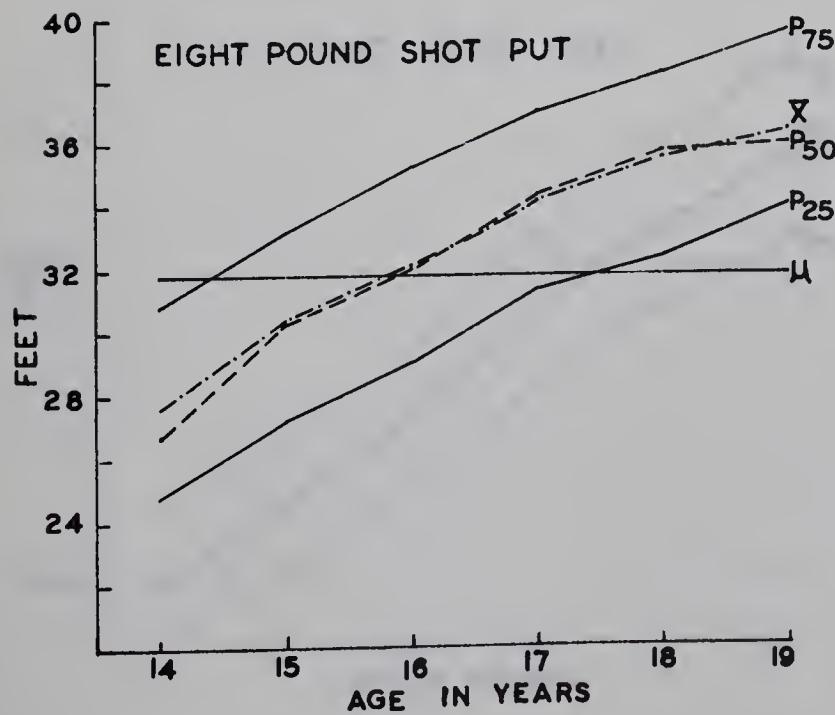
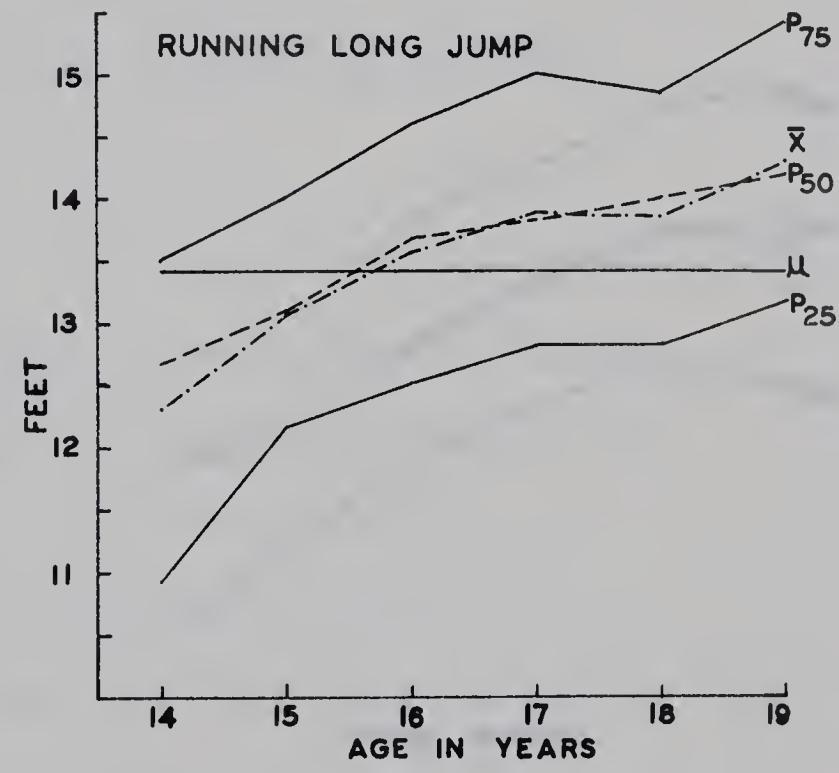
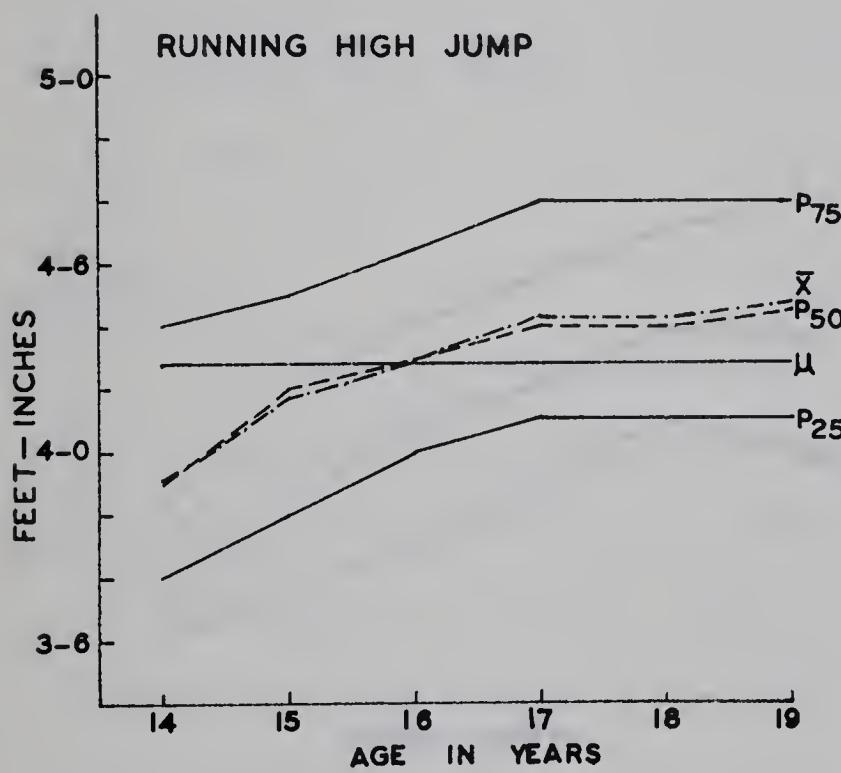
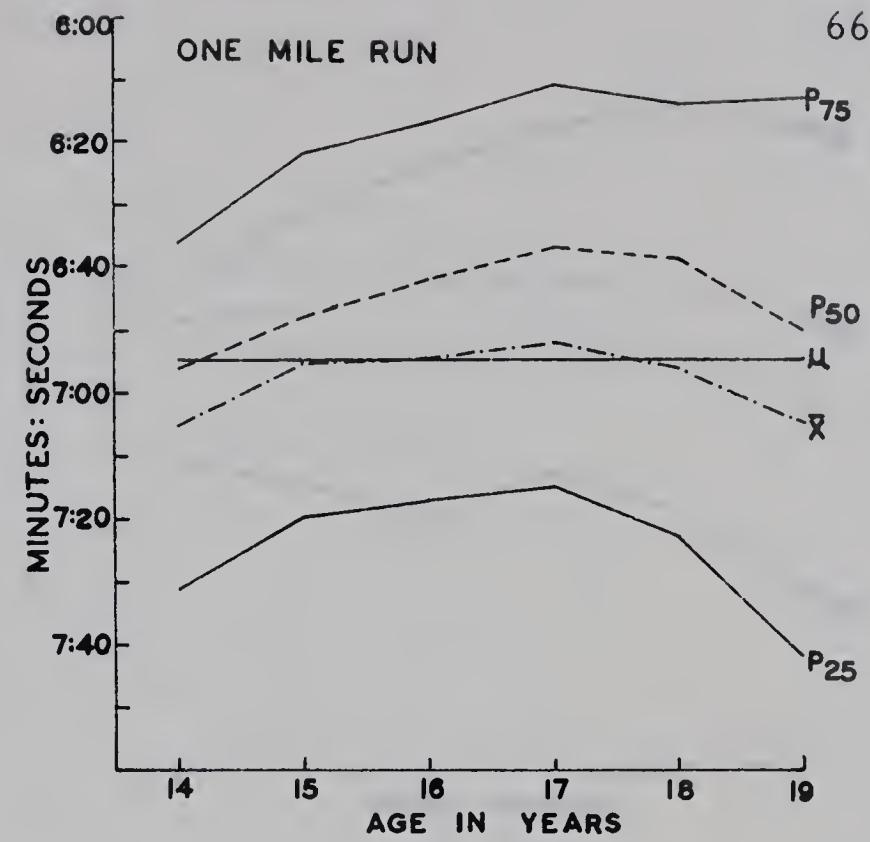
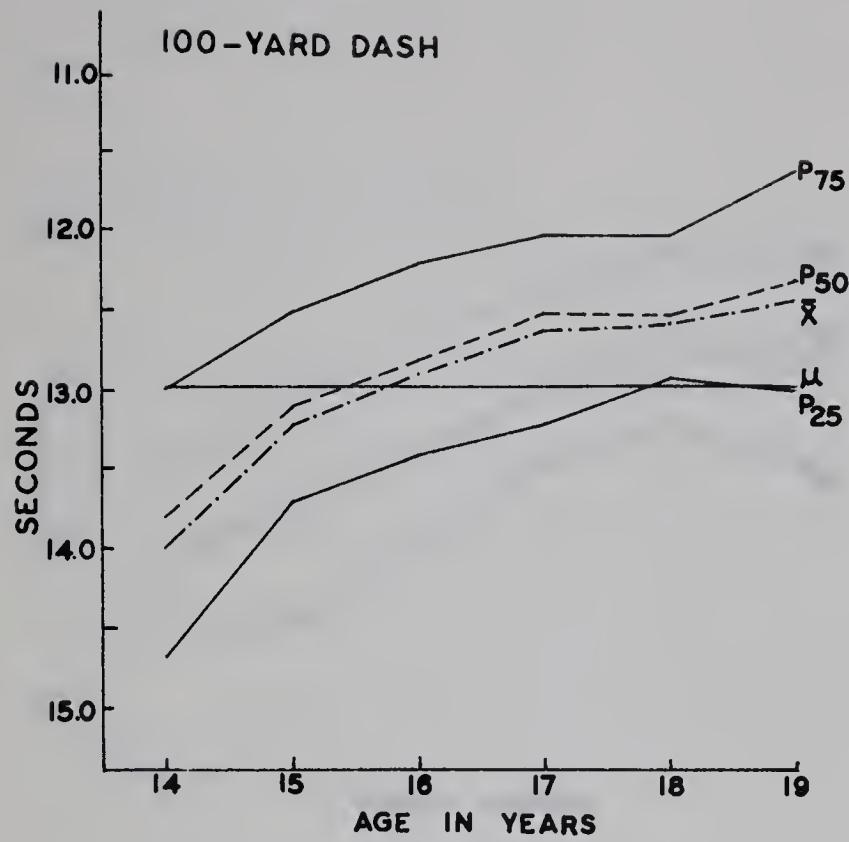


FIGURE I. INTERQUARTILE RANGE,  
MEDIAN AND MEANS OF TRACK AND  
FIELD EVENTS BASED ON AGE  
EDMONTON SENIOR HIGH SCHOOL BOYS  
MAY, 1966



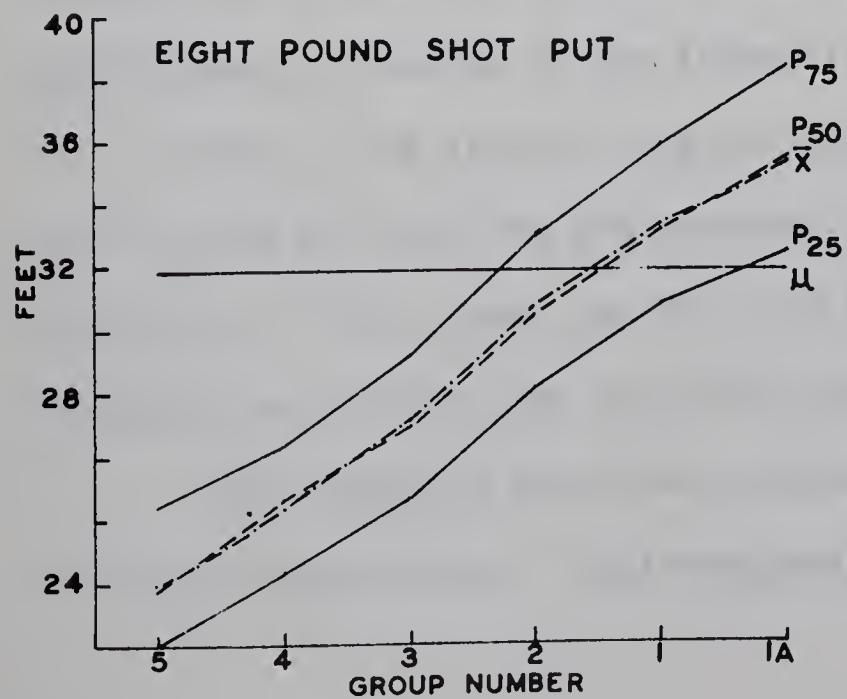
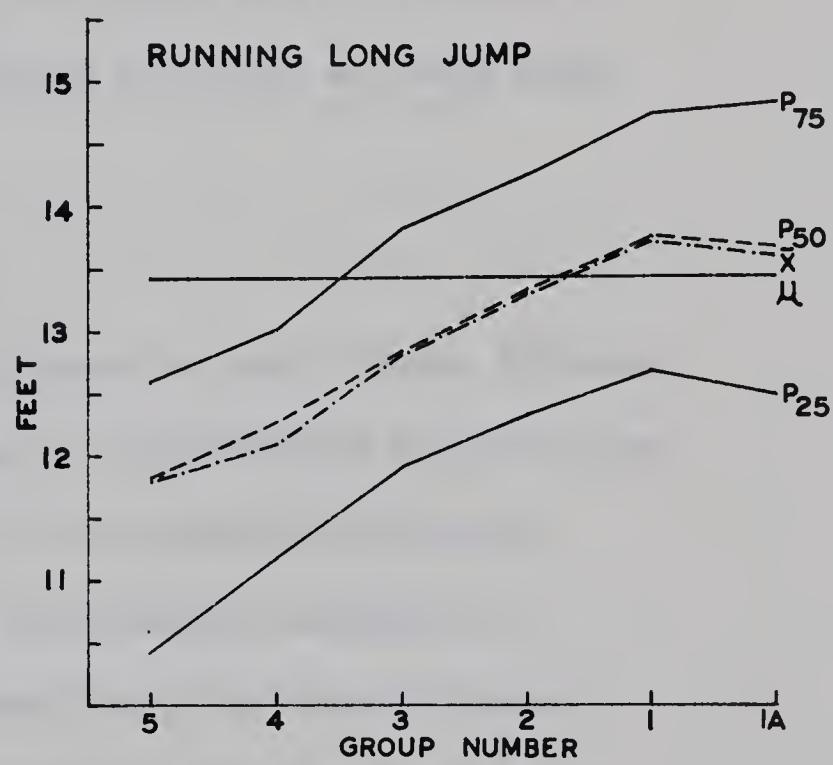
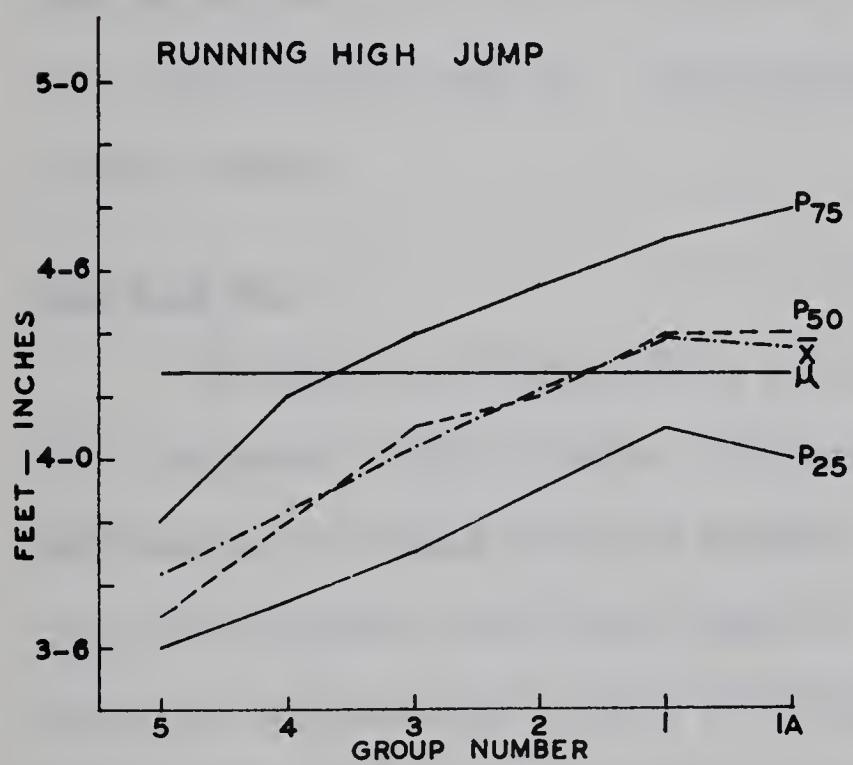
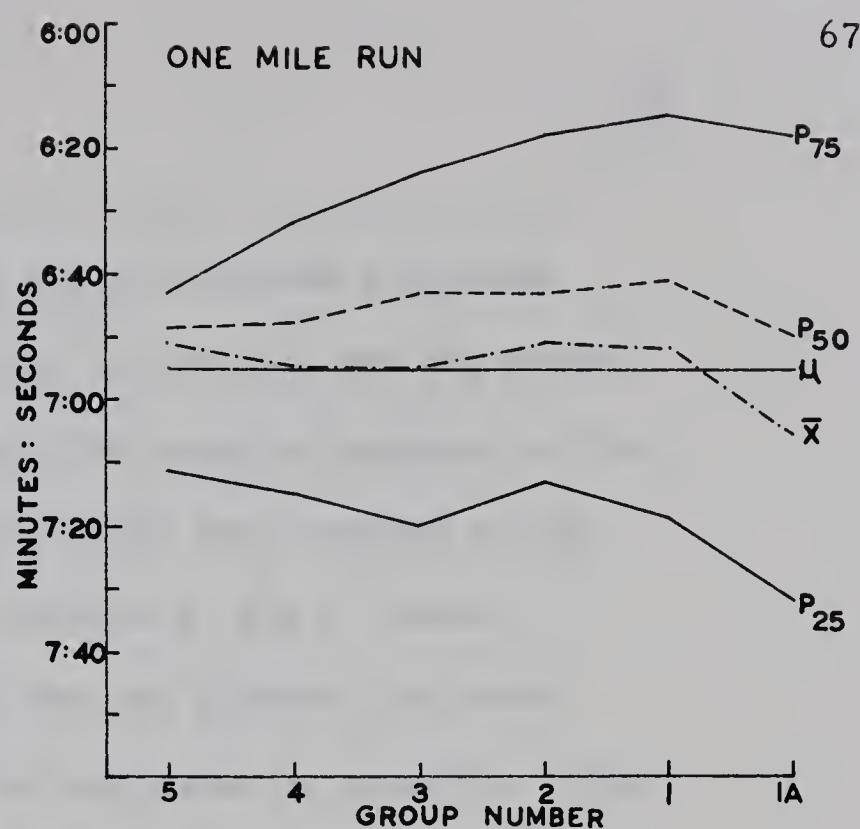
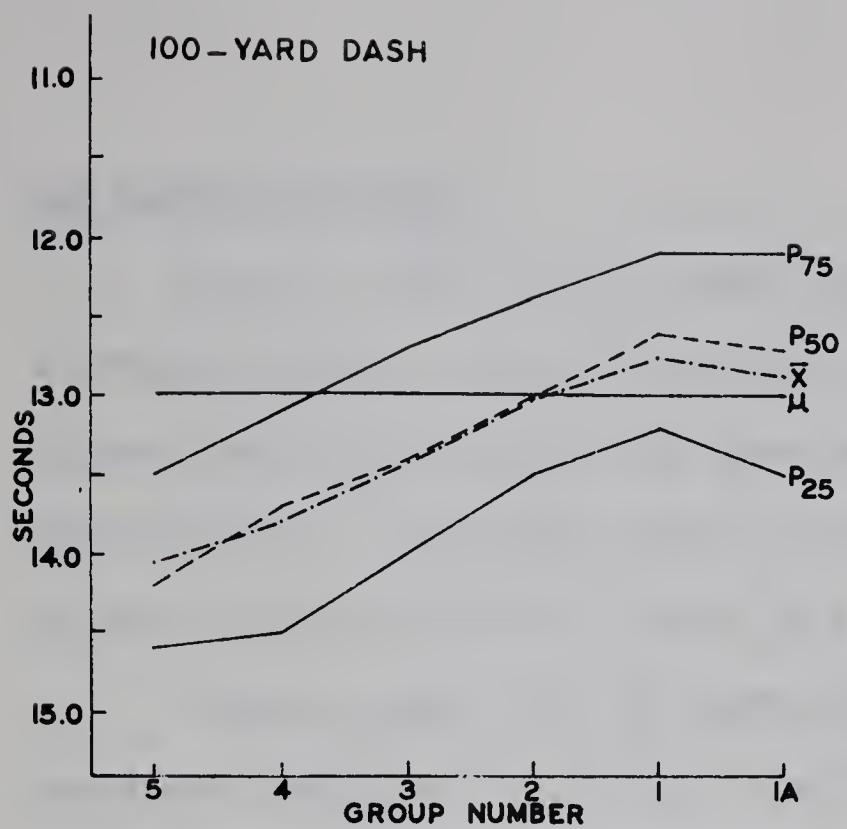


FIGURE 2. INTERQUARTILE RANGE,  
MEDIAN AND MEANS OF TRACK AND  
FIELD EVENTS BASED ON COZENS-  
TRIEB-NEILSON CLASSIFICATION FORMULA.  
EDMONTON SENIOR HIGH SCHOOL BOYS  
MAY, 1966



### One Hundred Yard Dash

Figure 1 shows that the speed for the one hundred yard dash increased with age. The relative positions of the mean and the median at each age level indicates the characteristic negative skewness of the distributions. The longest time of 19.5 seconds was recorded at age 15 years, and the shortest time of 10.4 seconds at age 17 years.

Figure 2 shows that the speed for the one hundred yard dash increases from group 5 to group 1 and then decreases to group 1A. This may be partially due to the influence of the weight factor included in the classification method. This distribution of scores was also negatively skewed.

### One Mile Run

The speed for the one mile run increased to age 17 years followed by a decrease to age 19 years. Endurance is a significant factor in the performance of middle distance running. In the senior high school physical education curriculum there is a much greater emphasis on endurance and physical fitness at the grade ten level than in grades eleven and twelve. The results seem to indicate that the level of performance is related to the intensity of the training and activity of the students. The results show that the average nineteen year old boy who has had at least two and possibly three school years of physical education in high school can only run the mile as fast as the average fourteen year old boy who is in his first year.

This condition should be considered when evaluating the current curricular objectives. The interquartile range increased from fifty-five



seconds to one minute and twenty-nine seconds. The distribution of scores was negatively skewed at all age groups.

Figure 2 illustrates that similar results occurred in the six classification groups. The increase in speed was somewhat the same except for a sharp decrease at the group 1A level. The interquartile range increased from twenty-eight seconds to one minute and fourteen seconds. It would appear that the combination of age, height, and weight was an inferior method to age for classifying students for the one mile run.

A total of 2,673 boys ran the mile with a mean time of six minutes and fifty-five seconds. Of this number, 1,647 or 62 per cent of the students, ran on cinder tracks yielding an average time of six minutes and fifty-six seconds. The remaining 1,026 boys, or 38 per cent, ran on the grass with an average time of six minutes and fifty-two seconds. This difference was not significant at the .05 level.

The maximum and minimum times of thirteen minutes, forty seconds and four minutes, fifty-nine seconds were recorded at the age sixteen years level.

#### Running High Jump

A steady increase in jumping height occurred to age seventeen years followed by a more gradual rise of only six-tenths of an inch to age nineteen. The interquartile range remained relatively constant throughout the various age groups. The score distributions showed slight negative skewness.

The classification groups displayed a greater increase in



performance from group 5 to group 1 with no further increase at the group 1A level. There was also a sudden increase in the interquartile range at this level. The scores were negatively skewed except at the group 5 level.

Table XXVIII shows that the least amount of improvement occurred among those who used the scissors style. Sixty-three per cent used this technique as compared to 32 per cent and five per cent for the straddle and western rolls.

Results of the t tests showed that there was a significant difference at the .01 level in the means of both the straddle and western roll and the scissors style. However, there was no significant difference between the straddle and the western roll.

It is of some concern that a majority of the boys preferred to use the scissors technique. It would appear that more emphasis should be placed on teaching proper techniques at all ages and serious consideration given to discarding the scissors technique. A mean increase of only four inches from ages fourteen to nineteen years does not justify the scissors technique in the physical education program when more effective methods are available.

#### Running Long Jump

The distance for the running long jump increased with age with the exception of a slight decrease of one inch at the age eighteen years level. The interquartile range remained relatively constant at



TABLE XXVIII

COMPARISON OF MEANS FOR THE RUNNING HIGH JUMP SHOWING NUMBER AND  
PER CENT OF CASES ACCORDING TO STYLES USED  
EDMONTON SENIOR HIGH SCHOOLS

Age	All Styles			Straddle Style			Scissors Style			Western Style		
	Height Ins.	No.	Per Cent	Height Ins.	No.	Per Cent	Height Ins.	No.	Per Cent	Height Ins.	No.	Per Cent
14	47.3	43	100	47.5	11	26	47.1	30	70	50.0	2	4
15	49.7	1098	100	50.0	336	31	49.4	706	64	51.4	56	5
16	51.0	984	100	52.0	343	35	50.4	582	59	51.8	59	6
17	52.2	394	100	53.7	132	34	51.2	241	61	53.6	21	5
18	52.2	160	100	54.8	34	21	51.1	117	73	58.1	9	6
19	52.8	38	100	56.6	12	32	51.0	26	68	--	0	--
14-19	50.7	2717	100	* 51.6	868	32	50.1	1,702	63	* 52.3	147	5

\* Means are significantly different from the Scissors style mean at the .01 level.



approximately two feet. Scores were distributed with a small degree of negative skewness as shown by the figures in Table XXVII.

Figure 2 shows a similar increase except for a distinct decrease in performance at the group 1A level. The weight factor may possibly account for this decrease as was indicated in the previous events.

The minimum and maximum scores were six feet, ten inches and nineteen feet, eleven inches at ages sixteen and seventeen years respectively.

It should be noted that the warmer temperature, lower rainfall, and increase in the wind speed during the testing period caused the sand in the jumping pits to be dry. Under these conditions the mark in the sand at the point of landing would yield a shorter jumping distance than if the sand had been kept moist. It is reasonable to conclude that the scores in the long jump are generally less than they would have been under ideal pit conditions.

Table XXIX shows that at every age the boys were able to jump farther when they were not restricted to the take-off board rules. This was the expected and only possible result that could have occurred in view of the rules for regular long jump competition. The writer was specifically interested in determining the amount of difference that would result from jumping both with and without the take-off board regulations. The results indicate that at all ages the students jumped an average of six inches farther when they did not have to comply with the take-off board regulations. Additional practice at hitting the take-off board properly would reduce the present difference to some degree.



TABLE XXIX

MEAN DIFFERENCES IN THE RUNNING LONG JUMP WITH AND WITHOUT  
 THE TAKE-OFF BOARD RULES  
 EDMONTON SENIOR HIGH SCHOOLS

Without the Take-Off Board Ruling		With the Take-Off Board Ruling	
Distance from Take-Off to Landing	Number of Subjects	Distance from Front of Take-Off Board to Landing	Number of Subjects
14	12-10	43	12-4
15	13-7	1,109	13-1
16	14-1	979	13-7
17	14-5	381	13-11
18	14-6	155	13-10
19	14-9	38	14-4
14-19	13-11.2	2,705	13-4.9
			2,748

Eight Pound Shot Put

The distances for throwing the eight pound shot increased steadily from ages fourteen to nineteen years. The interquartile range was very close to six feet at all ages. The distribution of scores changed from positive to negative skewness throughout the age range. The distortion in both directions was very small as noted by the close relationship of the means and medians.

Results from the six age, height, and weight classifications for the shot put were very similar to those of the six age groups. The characteristic levelling off and lowering of performance did not occur



in this event with either method of grouping. It seems reasonable to expect that if body weight was a handicap factor in the running and jumping events where such qualities as speed, endurance, agility and sudden release of power while running, are required, it was an advantage for performance in throwing the shot.

Table XXX shows the differences in the means for the shot put event according to two basic techniques. The results indicate that those students who elected to use the more recent O'Brien technique were able to put the shot an average of twenty-three inches farther than those who used the older orthodox style. This difference was highly significant at the .01 level.

Although the O'Brien style is more effective and more widely used in competition, it was noted that less than one boy in four uses this technique. The 74 per cent of the testing population that used the orthodox style had an average performance that is five inches below the mean for the whole population. The minimum and maximum scores were seventeen feet and forty-nine feet, eleven inches for ages fifteen and sixteen years respectively.

#### Minimum and Maximum Scores

According to age. Table XXXI shows the minimum and maximum performance scores for each test item at each age level. It is significant that none of these scores occurred at the two oldest age groups. Four of the six minimum scores were in the two youngest groups. All of the best performances were found in the sixteen and seventeen year old groups.



TABLE XXX

COMPARISON OF MEANS FOR THE EIGHT POUND SHOT PUT SHOWING NUMBER  
AND PER CENT OF CASES ACCORDING TO STYLES USED  
EDMONTON SENIOR HIGH SCHOOLS

Age	All Styles			O'Brien Style			Orthodox Style			Style Not Indicated			
	Distance No.	Per Cent	Distance No.	Per Cent	Distance No.	Per Cent	Distance No.	Per Cent	Distance No.	Per Cent	Distance No.	Per Cent	
14	27-7	42	100		25-10	4	10	27-10	35	83	27-3	3	
15	30-3	1080	100		31-6	199	18	30-0	841	78	30-1	40	
16	32-1	984	100		33-4	245	25	31-9	710	72	29-9	29	
17	34-2	392	100		35-6	96	25	33-8	283	72	35-1	13	
18	35-7	157	100		37-2	39	25	34-11	111	71	36-7	7	
19	36-5	41	100		37-11	10	24	35-6	25	61	37-9	6	
14-19	31-10.2	2696	100	*	33-4.1	593	22	*	31-5.2	2005	74	31-5.9	98

\* The difference between the means of the O'Brien and Orthodox styles was significant at the .01 level.



TABLE XXXI

MINIMUM AND MAXIMUM PERFORMANCE SCORES IN TRACK AND FIELD  
 EVENTS ACCORDING TO AGE  
 EDMONTON SENIOR HIGH SCHOOLS

		14	15	16	17	18	19
100 Yard Dash	Min.	17.4	19.5	18.0	15.8	16.0	14.5
	Max.	11.7	11.0	10.7	10.4	11.0	10.5
One Mile Run	Min.	9:41	13:20	13:40	11:05	11:55	10:57
	Max.	5:49	5:15	4:59	5:16	5:14	5:45
Running High Jump	Min.	2-6	2-8	2-6	2-10	2-11	3-5
	Max.	5-1	5-5	5-8	5-9	5-7	5-7
Running Long Jump (without board)	Min.	9-10	7-3	7-6	9-0	9-10	11-6
	Max.	15-10	18-0	18-3	19-3	18-3	17-10
Running Long Jump (with board)	Min.	9-3	7-6	6-10	8-0	8-5	10-0
	Max.	15-10	18-0	18-5	19-11	17-4	17-2
Eight Pound Shot Put	Min.	17-6	17-0	17-4	19-3	22-3	23-6
	Max.	41-1	48-10	49-4	47-11	48-6	44-4

According to age, height, and weight. Table XXXII lists the same performance scores based on the six groups according to the Cozens-Trieb-Nelson formula. All of the maximum scores were located in the three most mature groups along with one-half of the minimum scores. It appears that the classification index does, to some degree, place the best performances in the upper groups. It must be remembered, however, that in each case these scores are those of individual students in each group and do not represent the performances of the groups.



TABLE XXXII

MINIMUM AND MAXIMUM PERFORMANCE SCORES IN TRACK AND FIELD ACCORDING  
TO COZENS-TRIEB-NEILSON CLASSIFICATION FORMULA  
EDMONTON SENIOR HIGH SCHOOLS

		Class					
		5 70-74	4 75-78	3 79-82	2 83-87	1 88-91	1A 92+
100 Yard Dash	Min.	15.8	17.3	17.4	17.9	19.5	18.0
	Max.	12.0	11.6	11.5	10.7	10.4	10.5
One Mile Run	Min.	7:36	8:25	13:06	11:12	11:25	13:40
	Max.	6:15	5:29	5:15	4:59	5:14	5:16
Running High Jump	Min.	3-5	2-6	2-8	2-10	2-10	2-6
	Max.	4-3	4-9	5-3	5-5	5-7	5-9
Running Long Jump (without board)	Min.	10-8	9-7	7-3	8-11	9-6	7-6
	Max.	13-10	15-5	17-8	18-0	19-3	18-7
Running Long Jump (with board)	Min.	9-8	9-2	7-6	8-2	7-10	6-10
	Max.	14-6	14-11	17-1	17-10	17-9	19-11
Eight Pound Shot Put	Min.	17-4	17-0	19-1	18-0	22-11	21-11
	Max.	28-2	32-0	37-0	42-3	46-8	49-4

## VI. VALIDITY OF THE TEST ITEMS

The track and field events selected for this normative study measure the skill involved in their performance. The running high jump, for example, was selected as the best device for measuring how high an individual can jump. It does not pretend to measure such qualities as agility, power, or large muscle coordination. It is logical to say that the validity of each event is inherent within the activity itself. In terms of predictive validity the criterion and the testing device are one and the same.



## VII. OBJECTIVITY OF THE TEST ITEMS

The events selected for this study require a minimum of personal judgment on the part of the testers. The administration and measurement techniques for each activity were carefully reviewed at the two instructional sessions which were held to standardize the procedures. Measuring instruments were calibrated prior to the testing period. Conversion tables were supplied to minimize errors in the recorded results. Data calculations on the score cards were carefully checked before being transferred onto IBM punch cards.

In the writer's opinion the details of the test items were well understood and faithfully administered by the testers. It is therefore submitted that the test items and the performance scores of this study possess a high degree of objectivity.

## VIII. RELIABILITY OF THE RESULTS

At the conclusion of the testing schedule, ten boys were selected from each of nine classes of grade ten students to repeat the activities in order to compute test-retest correlations for each event. Table I shows that fifty-six of the boys were fifteen years of age and thirty-one boys were sixteen years old. The group was relatively homogeneous according to age and grade as compared to the total age range of the whole population. Table II indicates that the retest group was much more heterogeneous in terms of the age, height and weight classification groups.

The original testing schedule was administered to the group by four



different teacher testers. All of the retesting was done by the writer who was also one of the original testers.

Table XXXIII gives the means and the reliability coefficient for each event tested. In three events the number of subjects was only eighty-nine because of an injury to one boy. Rainy weather made it impossible for twelve boys to run the mile again before the end of the school year.

TABLE XXXIII

MEANS AND RELIABILITY COEFFICIENTS BASED ON A TEST-RETEST OF  
NINETY BOYS IN TRACK AND FIELD, MAY-JUNE, 1966  
EDMONTON SENIOR HIGH SCHOOLS

	N	Test	Means	r
		Retest		
100 Yard Dash	89	13.33	13.38	.89
One Mile Run	78	6:30.95	6:33.62	.78
Running High Jump	90	4-0.99	4-1.34	.86
Running Long Jump (without board)	89	13-9.90	13-6.0	.81
Running Long Jump (with board)	89	13-2.07	13.0.88	.75
Eight Pound Shot Put	90	29-11.74	29-3.29	.86

A number of the boys evidenced dissatisfaction at having to repeat the testing program, while the rest of their classmates received instruction in tennis and softball. This negative motivation may account for the lower mean scores from their retest performances. Intraindividual



and interindividual variations in physical performance also affect the correlation of scores and the measure of reliability.

The running long jump using the regular take-off board regulations produced the greatest variation in scores. This should be expected because of the degree of skill necessary to obtain maximum performance measures under the jumping rules. A reliability of .78 in the one mile run did not give results as reproducible as those for the one hundred yard dash at .89. Scores for the one mile run have a much wider time range in which to vary than scores in the one hundred yard dash.



## CHAPTER V

### SUMMARY AND CONCLUSIONS

#### I. SUMMARY

The principal objective of this normative study was to establish achievement scales in track and field events for senior high school boys in the city of Edmonton. The testing group consisted of all senior high school boys who were enrolled in physical education classes. A total of 2,927 students contributed performance scores during the testing period which took place in the regular physical education class time. All test items were administered by thirty-seven teachers who had been instructed in the details of each event. The size of the population and the time available for testing made it necessary to select five events which are representative of track and field activities. Those events selected were the one hundred yard dash, one mile run, running high jump, running long jump, and the eight pound shot put.

The boys were classified into groups using two different methods. Six age groups ranging from fourteen to nineteen years constituted one method. The second method utilized the Cozens-Trieb-Neilson Classification formula which includes the factors of age, height and weight. Six groups were formed based on the total exponential value of the three factors.

The study included a survey of the difference in the mean time of performance in the one mile run on cinder track and on the grass. The



differences in the mean high jump performances using the straddle roll, the scissors kick and the western roll were also determined from the results.

The difference in the mean long jump performances with and without the restrictions of the take-off board rule was calculated from the data.

The difference in the mean shot put performances using the O'Brien style and the older orthodox style was determined from the test results.

All the test results were verified with the testers and all mathematical conversions and computations were checked by the writer.

#### Percentile Performance Norms

The scoring tables in Chapter IV represent the actual performances of senior high school boys enrolled in physical education classes in Edmonton schools. There has been no attempt to infer that these standards apply to the total male high school population in Edmonton.

All data were transferred to IBM punch cards and then sorted and counted to facilitate the calculation of percentile scores. Means, standard deviations and skewness were obtained from the IBM 7040 Computer at the University of Alberta.

#### Evaluation of the Data

The percentile method of scoring was suitable due to the skewed nature of the test items.

Every effort was made to obtain results that were valid, objective, and reliable. The validity of the test items is inherent within



the events. All factors concerning judgment were standardized in the test procedures. Reliability coefficients were calculated from a retest of ninety boys. It was the opinion of the writer that the correlations obtained were of sufficient magnitude considering the homogeneity and size of the group, and the individual variability of performance in such activities.

It is hoped that the scoring tables may assist students and teachers in the following ways:

1. To diagnose and better understand individual differences in performance.
2. To compare individual and group performances with the present norms.
3. To motivate students toward self-improvement through practice and competition.
4. To serve as a basis for comparison of performances in future years and possible revision of the standards.

## II. CONCLUSIONS

The primary objective of this study was to establish norms for track and field events for male senior high school physical education students. The results are shown as percentile scoring tables in Chapter IV.

Conclusions that may be stated from the results of this study are as follows:



Distribution of Scores

1. Performance scores were negatively skewed in the one mile run and the one hundred yard dash events.
2. There was only slight negative skewness in the high jump and long jump events.
3. Performance scores for the eight pound shot put were normally distributed showing a slight shift from positive to negative skewness with increasing age.

Relationship of Performance to Age

4. The level of performance increased with age in the one hundred yard dash, high jump, long jump, and the shot put events.
5. The relationship of performance to age in the one mile run was curvilinear. Seventeen year old boys had the best average time while the fourteen and nineteen year old groups had the longest times.

Relationship of Performance to Age, Height, and Weight

6. Performance scores improved for the one hundred yard dash, high jump, long jump, and shot put events from group five to group one. There was a decrease in performance for the one hundred yard dash, high jump and long jump from group 1 to group 1A. The factor of body weight of the more mature group appeared to be a handicap in these events.

7. Performance in the shot put weight event increased in a linear relationship throughout all six classification groups. The factor of body weight did not handicap performance in this event.

8. There was an overall decrease in performance in the one mile



run from group 5 to group 1A. The combined factors of age, height, and weight appear to be inferior to age alone for classifying boys for the one mile run.

#### One Mile Run

9.. Mean time for those who ran the mile on grass was four seconds better than those who ran on cinder tracks. This difference in the means was not statistically significant at the .05 level.

#### Running High Jump

10. The increases in the means for the straddle, western and scissors styles were nine, eight, and four inches respectively from age fourteen to age nineteen years. The ratio of students using scissors, straddle and western was 6.3 : 3.2 : 0.5. The differences between the means of both the straddle and western roll techniques was statistically significant at the .01 level over the scissors style. However, there was no significant difference between the straddle and western means.

#### Running Long Jump

11. At all age levels the boys jumped an average of six inches farther when they were allowed to ignore the take-off board rulings.

#### Eight Pound Shot Put

12. The increase in the mean for those using the O'Brien style was twenty-three inches better than those using the orthodox style. Less than one boy of every four boys used the O'Brien technique. This difference was significant at the .01 level.



### III. RECOMMENDATIONS

The previous discussions and conclusions from the results of this study have led the writer to make the following recommendations:

1. That age be retained as the basis for grouping high school students for track and field competition.
2. That further study be undertaken to determine whether or not a true curvilinear relationship exists between age and the one mile run.
3. That the scissors style of high jumping be discarded, and that more emphasis be devoted to teaching the straddle and western techniques at all age levels.
4. That more attention be given to instructing students in the O'Brien style of throwing the shot put.
5. That similar projects be conducted to provide standards in other physical skills.
6. That the present norms be revised as the need arises.
7. That the results of this study be made available to all Edmonton high schools, and any others who may wish to use them.



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APPENDIX A  
CORRESPONDENCE



Edmonton, Alberta  
March 31st, 1966

Mr. T.D. Baker  
Deputy Superintendent,  
Edmonton Public School Board,  
Edmonton, Alberta.

Dear Mr. Baker:

I would like to have permission from the Edmonton Public School Board to receive assistance for my thesis research project in physical education. I have enclosed the completed request form along with the first draft of the thesis proposal. In addition to fulfilling a requirement for a master's degree, this type of project has real practical value to every teacher who works in the field of physical education.

I would be pleased to discuss the details of the project if you feel this is necessary.

An early reply would be appreciated in order that the many details may be planned prior to the proposed testing period in the first part of May.

Yours truly,

Lee S. Fairbanks  
Head of Physical Education  
Department,  
Ross Sheppard Composite  
High School



Edmonton, Alberta

April 1st, 1966

Mr. H.A. MacNeill, Auperintendent,  
Edmonton Separate School Board,  
Edmonton, Alberta.

Dear Mr. MacNeill:

I would like to have permission from the Edmonton Separate School Board to receive assistance for my thesis research project in physical education. I have enclosed the completed request form along with the first draft of the thesis proposal. In addition to fulfilling a requirement for a master's degree, this type of project has a real practical value to every teacher who works in the field of physical education. There is at present a great need for local norms to be established in both school systems.

I would be pleased to discuss the details of the project if you feel this is necessary.

An early reply would be appreciated in order that the many details may be planned prior to the proposed testing period in the first part of May.

Yours truly,

Lee S. Fairbanks  
Head of Physical Education  
Department,  
Ross Sheppard Composite  
High School



Edmonton, Alberta  
April 5th, 1966

Mr. Lee S. Fairbanks  
Department of Physical Education  
Ross Sheppard Composite High School  
13546 - 111 Avenue  
Edmonton, Alberta

Dear Mr. Fairbanks:

I have your request of April 1st regarding the study which you are conducting for thesis purposes. This matter has been discussed with Mr. J. Dunnigan, Supervisor of Physical Education, and he has indicated his approval of the project.

I would suggest that you contact Mr. Dunnigan at the office (429-2751) before beginning the study so that full co-operation will be given.

Yours truly,

H.A. MacNeill  
Superintendent of Schools

HAM/lm



Edmonton, Alberta  
April 14th, 1966

Mr. R.G. Glassford:  
Assistant Professor,  
Faculty of Physical Education,  
University of Alberta,  
Edmonton, Alberta.

Dear Mr. Glassford:

Your request for assistance in graduate student research on behalf of Mr. L.S. Fairbanks is hereby approved.

Yours truly,

T.D. Baker,  
Deputy Superintendent  
of Schools

\*dk  
c.c. L.S. Fairbanks  
A.S. Bird



Ross Sheppard Composite High School  
13546 - 111 Ave.,  
Edmonton, Alberta.  
April 16th, 1966

To all Principals and  
Physical Education Dept. Heads

Dear \_\_\_\_\_

Approval has been granted by the Edmonton Public School Board and the Edmonton Separate School Board to conduct the following thesis research project among all of the senior high school boys enrolled in physical education classes:

"A Study to Establish Norms for Edmonton High School Boys  
in Selected Track and Field Events"

This letter is a request for your permission to work with the physical education teachers in your school to obtain the necessary data for the study. The plan of the study is to measure each boy in each of the following parameters during the regular class periods in track and field:

Age, Height, and Weight

Performance in

- (a) 100 - yard dash
- (b) One mile run
- (c) Running High Jump
- (d) Running Long Jump
- (e) 8 lb. Shot Put

From this data norms will be tabulated and made available to your school.

An early reply would be most appreciated in order that plans may be completed in time to commence the project on Monday, May 2nd.

Yours sincerely,  
Lee S. Fairbanks,  
Physical Education Dept. Head



Ross Sheppard Composite High School  
13546 - 111 Ave.,  
Edmonton, Alberta.  
April 21st, 1966

To All Male Physical Education  
Teachers in the Edmonton Separate  
High Schools,

Dear \_\_\_\_\_

Approval has been granted by Mr. H.A. MacNeil and Mr. John Dunnigan to conduct the following research project in the high schools:

"A Study to Establish Norms for Edmonton High School Boys  
in Selected Track and Field Events"

In order to standardize procedures for testing the performances of the students in your physical education classes, a Briefing Workshop Meeting has been scheduled as follows:

Monday, April 25th, 4:15 PM - 5:00 PM.  
St. Joseph's High School Gymnasium

It is very essential that every teacher attend this meeting. All instructions and materials will be given at that time.

The department head from each school should also bring:

- (a) Your two best stop-watches to be calibrated.
- (b) Your 75 ft. or 100 ft. steel tape.
- (c) Your 6 ft. or 8ft. steel tape.

The testing program for each student will include:

- Age, Height, and Weight
- Performance in the 100-yard dash, one mile run, running high jump, running long jump, and the 8 lb. shot put.

From this data norms or standards will be tabulated and made available to your school. This project is also being conducted in the Public High Schools. I sincerely appreciate this opportunity and the excellent cooperation of those who have and will make this study possible. May I solicit your support in this project,

Yours truly,

Lee S. Fairbanks  
Physical Education Dept. Head



Ross Sheppard Composite High School  
13546 - 111 Ave.,  
Edmonton, Alberta.  
April 21st, 1966

To All Male Physical Education  
Teachers in the Edmonton Public  
High Schools,

Dear \_\_\_\_\_

Approval has been granted by Mr. T.D. Baker and Mr. A.S. Bird to conduct the following research project in the high schools:

"A Study to Establish Norms for Edmonton High School Boys  
in Selected Track and Field Events"

In order to standardize procedures for testing the performance of the students in your physical education classes, a Briefing Workshop Meeting has been scheduled to take place immediately following the Track and Field Inservice Session on Wednesday evening, April 27th, commencing at 7:30 PM.

The meeting will thus be serving two purposes and it will avoid the need for a separate meeting at another time. The physical education staff at central office have kindly consented to this arrangement.

Since this study is designed to develop norms or standards from the data, it is most essential that every male physical education teacher attend this meeting. All instructions and materials will be given at that time.

The department head or assistant from each school is requested to bring to the briefing workshop the following:

- (a) Your two best stop-watches to be calibrated.
- (b) Your best 75 ft. or 100 ft. steel tape.
- (c) Your 6 ft. or 8 ft. steel tape.

The testing program is to have each physical education teacher measure his own students in regular class periods in the following:

- Age, Height, and Weight
- Performance in the 100-yard dash, one mile run, running high jump, running long jump, and the 8 lb. shot put.

Copies of the norms will be made available to all schools for use by the teachers and students to motivate and evaluate performance in these events. This project is also being conducted in all the Separate High Schools.

I wish to convey my appreciation for this opportunity, and for the excellent cooperation of all those teachers and students that make this study possible. I sincerely solicit your support in this project.

Yours truly,  
Lee S. Fairbanks  
Physical Education Dept. Head



APPENDIX B  
STATISTICAL TREATMENT



CONVERSION OF AGE IN YEARS ONLY, TO AGE IN YEARS AND MONTHS  
AS AT MAY 1st, 1966

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<u>Birthdays on</u>		<u>Extra Months to be Added</u>
May 2nd	to May 16th	12 months (1 whole year)
May 17	to June 16	11 months
June 17	to July 16	10 months
July 17	to August 16	9 months
August 17	to September 16	8 months
September 17	to October 16	7 months
October 17	to November 16	6 months
November 17	to December 16	5 months
December 17	to January 16	4 months
January 17	to February 16	3 months
February 17	to March 16	2 months
March 17	to April 16	1 month
April 17	to May 1st	0 months

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CONVERSION OF AGE IN YEARS AND MONTHS, TO AGE IN TOTAL MONTHS  
 AS AT MAY 1st, 1966

<u>Years and</u>	<u>Months</u>	<u>to Months</u>
13 - 6	=	162
13 - 7		163
13 - 8		164
13 - 9		165
13 - 10		166
13 - 11		167
14 - 0		168
14 - 1		169
14 - 2		170
14 - 3		171
14 - 4		172
14 - 5		173
14 - 6		174
14 - 7		175
14 - 8		176
14 - 9		177
14 - 10		178
14 - 11		179
15 - 0		180
15 - 1		181
15 - 2		182
15 - 3		183
15 - 4		184
15 - 5		185
15 - 6		186
15 - 7		187
15 - 8		188
15 - 9		189
15 - 10		190
15 - 11		191
16 - 0		192
		16 - 1 = 193
		16 - 2 = 194
		16 - 3 = 195
		16 - 4 = 196
		16 - 5 = 197
		16 - 6 = 198
		16 - 7 = 199
		16 - 8 = 200
		16 - 9 = 201
		16 - 10 = 202
		16 - 11 = 203
		17 - 0 = 204
		17 - 1 = 205
		17 - 2 = 206
		17 - 3 = 207
		17 - 4 = 208
		17 - 5 = 209
		17 - 6 = 210
		17 - 7 = 211
		17 - 8 = 212
		17 - 9 = 213
		17 - 10 = 214
		17 - 11 = 215
		18 - 0 = 216
		18 - 1 = 217
		18 - 2 = 218
		18 - 3 = 219
		18 - 4 = 220
		18 - 5 = 221
		18 - 6 = 222
		18 - 7 = 223
		18 - 8 = 224
		18 - 9 = 225
		18 - 10 = 226
		18 - 11 = 227
		19 - 0 = 228
		19 - 1 = 229
		19 - 2 = 230
		19 - 3 = 231
		19 - 4 = 232
		19 - 5 = 233
		19 - 6 = 234
		19 - 7 = 235
		19 - 8 = 236
		19 - 9 = 237
		19 - 10 = 238
		19 - 11 = 239
		20 - 0 = 240
		20 - 1 = 241
		20 - 2 = 242
		20 - 3 = 243
		20 - 4 = 244
		20 - 5 = 245
		20 - 6 = 246
		20 - 7 = 247
		20 - 8 = 248
		20 - 9 = 249
		20 - 10 = 250
		20 - 11 = 251
		21 - 0 = 252



## STOP-WATCH CORRECTION TABLE FOR THE 100-YARD DASH

Watch Error for Five Minutes	Runner's Time in Seconds	Correction, to be added <u>or</u> subtracted
0 to 7 tenths	all times	0
8 tenths	18.8 and up	1 tenth
9 tenths	16.7 and up	1 tenth
1.0 secs.	15.0 and up	1 tenth
1.1 secs.	13.6 and up	1 tenth
1.2 secs.	12.5 and up	1 tenth
1.3 secs.	11.5 and up	1 tenth
1.4 secs.	10.7 and up	1 tenth
1.5 secs.	10.0 and up	1 tenth
1.6 secs.	9.4 and up	1 tenth
1.7 secs.	8.8 and up	1 tenth
1.8 secs.	8.3 and up	1 tenth
1.9 secs.	7.9 and up	1 tenth
2.0 secs.	7.5 and up	1 tenth

Underline the error of  
your watch, and use only  
that correction.



## STOP-WATCH CORRECTION TABLE FOR THE ONE MILE RUN

Watch Error for Five Minutes	Runner's Time (Min.:Secs.)	Correction, to be added <u>or</u> subtracted
0 to 4 tenths	all times	0
5 tenths	5 min. and up	1 sec.
6 tenths	4:10 and up	1 sec.
7 tenths	3:34 and up	1 sec.
8 tenths	3:08 and up	1 sec.
9 tenths	2:47 and up	1 sec.
1.0 secs.	2:30 and up	1 sec.
1.1 secs.	2:16 and up	1 sec.
	6:49 and up	2 secs.
1.2 secs.	2:05 and up	1 sec.
	6:15 and up	2 secs.
1.3 secs.	1:55 and up	1 sec.
	5:46 and up	2 secs.
1.4 secs.	1:47 and up	1 sec.
	5:21 and up	2 secs.
1.5 secs.	1:40 and up	1 sec.
	5:00 and up	2 secs.
1.6 secs.	1:34 and up	1 sec.
	4:41 and up	2 secs.
1.7 secs.	1:28 and up	1 sec.
	4:25 and up	2 secs.
1.8 secs.	1:23 and up	1 sec.
	4:10 and up	2 secs.
1.9 secs.	1:19 and up	1 sec.
	3:57 and up	2 secs.
	6:35 and up	3 secs.
2.0 secs.	1:15 and up	1 sec.
	3:45 and up	2 secs.
	6:15 and up	3 secs.

Underline the error of  
your watch, and use only  
that correction.



NO.1

## EDMONTON CITY SENIOR HIGH SCHOOLS NORMATIVE STUDY IN TRACK AND FIELD, MAY, 1966 - LEE S. FAIRBANKS.

CODE IDENTIFICATION LEAVE BLANK	NAME PRINT. ARRANGE ALPHABETICALLY BY SURNAME	AGE		HEIGHT IN INCHES	WEIGHT COZENS-TRIEB-NEILSON	CLASSIFICATION INDEX	100 YARD DASH		ONE MILE RUN	RUNNING HIGH JUMP
		AGE IN YEARS ONLY,	BIRTHDATE IN MONTHS ONLY,				IN SECONDS	INDICATE 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40.	INDICATE 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40.	
SCHOOL	EXAMPIE	ANDERSON	TOM	16	10	MAY/50	16-2	194	69.5	163
TEACHER										

 RECORD STUDENTS OF  
ONE GRADE ONLY ON THIS SHEET

GRADE

DATE



EDMONTON CITY SENIOR HIGH SCHOOLS NORMATIVE STUDY IN TRACK AND FIELD, MAY, 1966 - LEE S. FAIRBANKS. No. 2

NAME	RUNNING LONG JUMP			RUNNING LONG JUMP			EIGHT POUND SHOT PUT			COMMENTS	
	(WITHOUT TAKE-OFF BOARD)		(WITH TAKE-OFF BOARD)	IN FEET AND INCHES TO THE NEAREST INCH.		CONVERT BEST PUT TO INCHES	IN FEET AND INCHES TO THE NEAREST INCH.		CONVERT BEST PUT TO INCHES	INDICATE STYLE	
SURNAME	FIRST NAME	IN FEET AND INCHES TO THE NEAREST INCH. CIRCLE THE BEST JUMP.	IN FEET AND INCHES TO THE NEAREST INCH. CIRCLE THE BEST JUMP.	IN FEET AND INCHES TO THE NEAREST INCH. CIRCLE THE BEST JUMP.	IN FEET AND INCHES TO THE NEAREST INCH. CIRCLE THE BEST JUMP.	IN FEET AND INCHES TO THE NEAREST INCH. CIRCLE THE BEST JUMP.	IN FEET AND INCHES TO THE NEAREST INCH. CIRCLE THE BEST JUMP.	IN FEET AND INCHES TO THE NEAREST INCH. CIRCLE THE BEST JUMP.	IN FEET AND INCHES TO THE NEAREST INCH. CIRCLE THE BEST JUMP.	1. BACK SIDE	2. BACK SIDE
TRIAL I	TRIAL II	TRIAL III	INCHES	TRIAL I	TRIAL II	TRIAL III	INCHES	TRIAL I	TRIAL II	TRIAL III	
→ANDERSON	TOM	14-1	16-3	16-0	19-5	14-7	15-9	15-10	19-1	43-6	46-7 (46-9) 561 2

RECORD STUDENTS OF ONE  
GRADE ONLY ON THIS SHEET

TEACHER

DATE

GRADE



090	1	1	100		110	2	13	120	7	32	130	8	85	140	12	197	
091			101		111	1	14	121	3	35	131	8	93	141	14	211	
092			102	1	5	112		122	8	43	132	10	103	142	12	223	
093			103	2	7	113	2	16	123	6	49	133	7	110	143	18	241
094			104			114	1	17	124	1	50	134	17	127	144	25	266
095	2	3	105	1	8	115	2	19	125	8	58	135	12	139	145	11	277
096			106	2	10	116	2	21	126	6	64	136	15	154	146	28	305
097			107	1	11	117	2	23	127	2	66	137	8	162	147	20	325
098	1	4	108			118	1	24	128	4	70	138	9	171	148	23	348
099			109			119	1	25	129	7	77	139	14	185	149	27	325
	4				7 (11)		14 (25)		52 (77)			108 (185)			190 (325)		
150	28	403	160	30	641	170	19	876	180	15	1014	190	7	1081	200	1	1109
151	20	423	161	25	666	171	15	891	181	10	1024	191	4	1085	201	1	1110
152	31	454	162	20	686	172	15	906	182	11	1035	192	4	1089	202	2	1112
153	20	474	163	18	704	173	12	918	183	7	1042	193	1	1090	203		
154	22	496	164	26	730	174	14	932	184	7	1049	194	2	1092	204	1	1113
155	31	527	165	24	754	175	22	954	185	6	1055	195	8	1100	205	1	1114
156	27	554	166	33	787	176	8	962	186	5	1060	196	1	1101	206	1	1115
157	10	564	167	25	812	177	12	974	187	6	1066	197	5	1106	207	1	1116
158	25	589	168	28	840	178	16	990	188	7	1073	198			208		
159	22	611	169	17	857	179	9	999	189	1	1074	199	2	1108	209		
		236 (611)			246 (857)		142 (999)		75 (1074)			34 (1108)		8 (1116)			
210			220			230		240			250			260			
211			221			231		241			251			261			
212			222			232		242			252			262			
213	1	1117	223			233		243			253			263			
214			224			234		244			254			264			
215			225			235		245			255			265			
216	1	1118	226			236		246			256			266			
217			227			237		247			257			267			
218			228			238		248			258			268			
219			229			239		249			259			269			
	2 (1118)																
270			280			290		300			310			320			
271			281			291		301			311			321			
272			282			292		302			312			322			
273			283			293		303			313			323			
274			284			294		304			314			324			
275			285			295		305			315			325			
276			286			296		306			316			326			
277			287			297		307			317			327			
278			288			298		308			318			328			
279			289			299		309			319			329			
330			340			350		360			370			380			
331			341			351		361			371			381			
332			342			352		362			372			382			
333			343			353		363			373			383			
334			344			354		364			374			384			
335			345			355		365			375			385			
336			346			356		366			376			386			
337			347			357		367			377			387			
338			348			358		368			378			388			
339			349			359		369			379			389			

FREQUENCY TALLY  
for  
THE LONG JUMP  
WITH THE  
TAKE-OFF BOARD  
BOYS AGE 15.

%	Cum.	Perf.
ile	Freq.	Scores
100-	1118	- 216"
95-	1062.1	- 187
90-	1006.2	- 180
85-	950.3	- 175
80-	894.4	- 172
75-	838.5	- 168
70-	782.6	- 166
65-	726.7	- 164
60-	670.8	- 162
55-	614.9	- 160
50-	559	- 157
45-	503.1	- 155
40-	447.2	- 152
35-	391.3	- 150
30-	335.4	- 148
25-	279.5	- 146
20-	223.6	- 143
15-	167.7	- 138
10-	111.8	- 134
5-	55.9	- 125
0-	0	- 090

N = 1118

No data rejects 54

TOTAL 1172



## COMPUTATION OF RELIABILITY COEFFICIENTS

$$r = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$$

where  $r$  = correlation coefficient

$N$  = number of correlated observations

$X$  = individual test scores

$Y$  = individual retest scores





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